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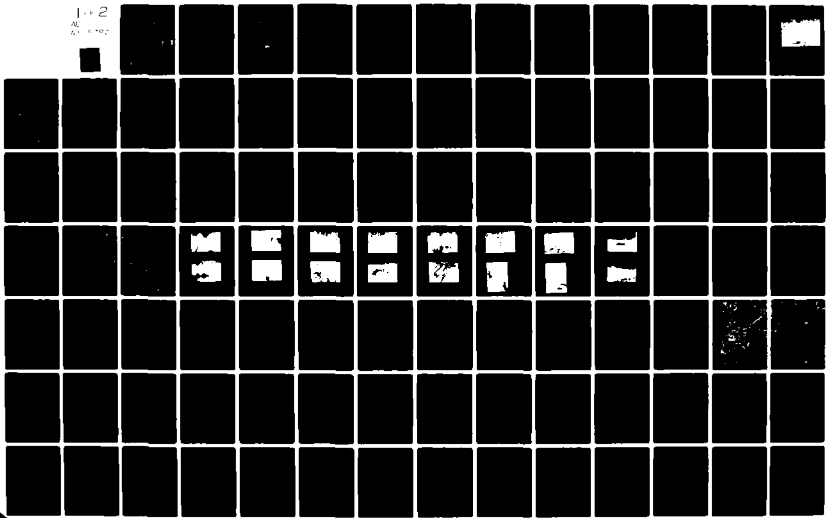

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National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability

Wright Lake Dam
Rensselaer County
Lower Hudson River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some serious deficiencies which require further investigation and remedial work.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 11% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

LOWER HUDSON RIVER BASIN

CITY OF TROY

RENSSELAER COUNTY, NEW YORK

WRIGHT LAKE DAM
NY 00757

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW YORK DISTRICT, CORPS OF ENGINEERS

26 FEDERAL PLAZA

NEW YORK, NY 10278

JULY 1981 10 [illegible] 9

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

27; WRIGHT LAKE DAM, NY 00757

PHASE I INSPECTION REPORT

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.21 NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.:	NY 00757
Name of Dam:	Wright Lake Dam
State Located:	New York
County:	Rensselaer
Municipality:	City of Troy
Watershed:	Lower Hudson River Basin
Stream:	Piscawan Kill
Date of Inspection:	May 6, 1981

ASSESSMENT

Examination of available documents and visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some serious deficiencies which require further investigation and remedial work.

Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 11% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

11 ? Therefore, it is recommended that within 3 months after receipt of this report by the Owner, a detailed hydrologic and hydraulic analysis be started to better assess spillway capacity. This should include a more accurate determination of the site specific characteristics of the watershed. Within 18 months after receipt of this

report by the Owner, any appropriate remedial work should be completed. The detailed analysis and the design and construction observation of any remedial work should be done by a qualified, registered professional engineer.

In the meantime, the Owner should immediately institute a program to visually inspect the dam and its appurtenances at least once a month. Also, within 3 months after receipt of this report the Owner should complete development of a surveillance program for use during periods of heavy runoff and of an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

The downstream slope of the dam is about 1.6H:1V, which is considerably steeper than that of similar dams designed in accordance with modern standards of practice. Therefore, it is recommended that a stability investigation of the embankment, with particular attention to the steepness of the downstream slope, be started within 3 months after receipt of this report by the Owner. Any necessary remedial work should be completed within 18 months after receipt of this report by the Owner. The investigation and the design and construction observation of any remedial work should be done by a qualified, registered professional engineer.

Because of other deficiencies, the following additional investigations should be started within 3 months after receipt of this report by the Owner. The investigations should be performed by a qualified, registered professional engineer.

1) Investigate the soft, wet area next to the downstream toe of the dam between the left abutment and the spillway outlet conduit.

2) Investigate the structural deterioration and leakage into the gate chamber and drop inlet spillway structure and determine how repairs should be made. Major modifications to increase spillway capacity may be required depending on the results of the detailed hydrologic and hydraulic analysis.

Any remedial work deemed necessary as a result of these investigations should be completed within 18 months after receipt of this report by the Owner. A qualified, registered professional engineer should design and observe the construction of any necessary remedial work.

The following remedial work should be completed by the Owner within 12 months after his receipt of this report. Where engineering assistance is indicated, the Owner should engage a qualified, registered professional engineer. Assistance by such an engineer may also be useful for some of the other work.

1) Reset the one capstone which is displaced and hanging from the crest of the drop inlet spillway.

2) Restore at least the lowest of the three outlet gates to operation. Also, clean and inspect the low level outlet port below the lowest outlet gate and verify that it can be opened by removing the planking which reportedly seals it. As an alternate, install an operating gate on the low level outlet. The outlet gate should be exercised regularly.

3) Temporarily repair the undermining of the downstream end of the spillway outlet conduit so as to remove a potential threat to the stability of the embankment. Major permanent repair or modification of the spillway outlet conduit, as well as repair of minor deterioration of some of the masonry along the barrel of the conduit and of some of the concrete at the downstream end, can wait until the need for additional spillway capacity has been fully evaluated by the detailed hydrologic and hydraulic analysis. Also, the detailed embankment stability investigation could affect the downstream end of the spillway outlet conduit.

4) Remove trees and brush and their root systems from the embankment and from a zone 50 feet wide next to the downstream toe in accordance with specifications and field observation of the work by an engineer. Backfilling the zones where stumps and roots have been removed should be done with proper material and procedures. Continue to keep these same areas clear by cutting, mowing, and cleanup at least annually.

5) Repair erosion and provide erosion protection on the upstream and downstream slopes of the dam in accordance with design and field observation of the work by an engineer.

6) Develop and implement effective routine operation and maintenance procedures for the dam and its appurtenances.

7) Institute a program of comprehensive technical inspection of the dam and its appurtenances by an engineer on a periodic basis of at least once every two years.

NY 757

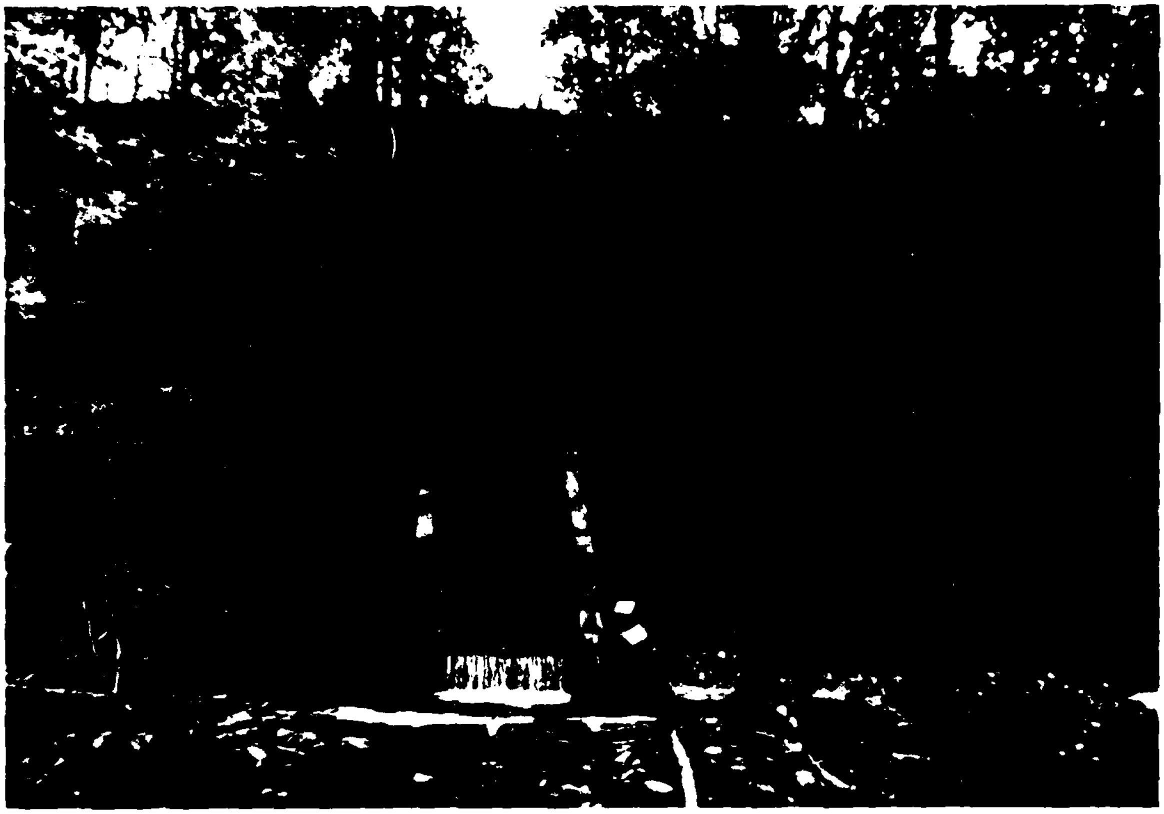
LICENSED PROFESSIONAL ENGINEER
KENNETH J. MALE
25004
UNIVERSITY OF THE STATE OF NEW YORK
& LAND SURVEYOR

Kenneth J. Male
President
C. T. Male Associates, P.C.
NY PE 25004

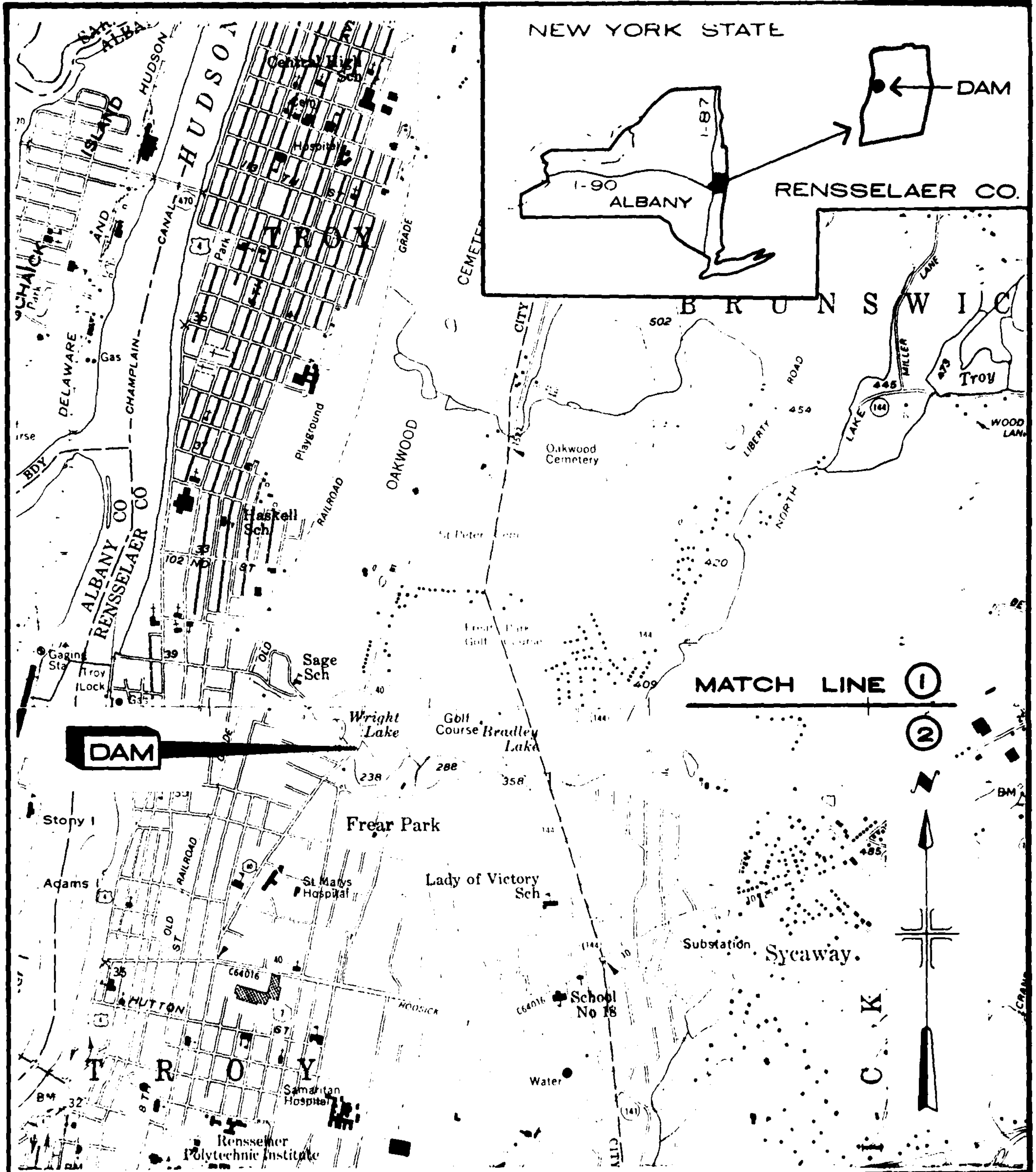
Approved by:

Col. W. M. Smith, Jr.
New York District Engineer
Corps of Engineers

Date: 18 Aug 81



Overview Photo - Wright Lake Dam - 5/6/81



SCALE OF FEET

0 2000 4000

BASE MAP: NYS-DOT PLANIMETRIC QUADS., 7.5 MIN.

① - NORTH TROY, 1974

② - SOUTH TROY, 1974

PROJECT NO. 58.01.012/80.852

WRIGHT LAKE DAM

VICINITY MAP

CITY OF TROY	RENSSELAER CO., NY
SCALE 1" = 2000'	DATE JANUARY 1981

C. T. MALE ASSOCIATES, P. C.

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

NAME OF DAM: WRIGHT LAKE DAM, ID NO. NY 00757

SECTION 1

PROJECT INFORMATION

1.1 GENERAL

a. Authority

The National Dam Inspection Act, Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New York District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within New York State. C. T. Male Associates, P.C., has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to C. T. Male Associates, P.C., under a letter from Michael A. Jezior, LTC, Corps of Engineers. Contract No. DACW51-81-C-0014 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purpose of the inspection program is to perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public, and thus permit correction in a timely manner by non-Federal interests.

1.2 DESCRIPTION OF PROJECT

a. Location

The dam is located on the Piscawan Kill, a tributary of the Hudson River, in the City of Troy. The dam at its maximum section is at Latitude 42 degrees - 44.9 minutes North, Longitude 73 degrees - 40.3 minutes West.

Access to the dam is from State Route 7 (Hoosick Street) to the south, then north via Oakwood Avenue (NYS Route 40) to the dam (see Vicinity Map). Oakwood Avenue runs along the top of the dam.

The official name of the dam is Wright Lake Dam, and the official name of the impoundment is Wright Lake. The impoundment has also been known as Oakwood Reservoir, Lower Oakwood Reservoir, and Old Reservoir Number Two.

b. Description of Dam and Appurtenances

Wright Lake Dam is an earthen embankment about 46 feet high, 350 feet long, and averaging about 54 feet wide at the crest. On the crest of the dam there is a paved roadway about 34 feet wide (NYS Route 40 - Oakwood Avenue). The upstream and downstream slopes of the dam are 2H:1V and 1.6H:1V, respectively. A tan silty sand and gravel is exposed on the upstream slope of the embankment, and a gray silty sand and gravel is exposed on the downstream slope. Old Troy Water Commissioners Reports from the time of construction describe the dam as being "made of puddle work, consisting of clay and sand, and of earth" where the puddle starts "several feet below the natural surface of the ground, on solid foundation". No other information is available as to the soils that comprise the interior of the embankment or the soil and/or rock that comprise the foundation. Both abutments appear to consist of soil. No bedrock outcrops were observed in the vicinity of the dam.

The dam has a drop inlet spillway located at about the middle of the dam. The drop inlet is part of a brick masonry and concrete control structure for the dam. The drop inlet has about a 6.5-foot by 10.5-foot rectangular clear opening with a total weir length of about 34 feet. At the bottom of the drop inlet shaft there is an oval brick and stone masonry outlet conduit. The brick masonry portion of the outlet conduit is about 40 feet long and about 4.5 feet wide by 8.5 feet high. The stone masonry arch portion, which is bricked lined at the bottom, is about 100 feet long and about 6 feet wide by 9 feet high. At the downstream end of the outlet conduit there is about a 30-foot-long concrete box section which discharges into the downstream channel.

On the upstream side of the control tower there are 3 slide gates (believed to be inoperable) at various elevations as well as a lower port planked shut, all inletting to a gate chamber in the control tower just upstream of the drop inlet. Between the gate chamber and the drop inlet shaft there appears to be an opening of some kind with a possible control mechanism. The opening between the gate chamber and drop inlet was not accessible or clearly observable.

c. Size Classification

In accordance with Recommended Guidelines (Reference 1), Wright Lake Dam is classified as "intermediate" in size because its height is about 46 feet (within the 40 to 100-foot range). The maximum storage capacity of the reservoir at the top of dam is 129 acre-feet.

439 d. Hazard Classification

In accordance with Recommended Guidelines (Reference 1), Wright Lake Dam is classified as having a "high" hazard potential.

This is because it is judged that failure of the dam would significantly increase flows downstream which could cause loss of more than a few human lives and excessive property damage. Downstream development that could be damaged or destroyed by a dam failure includes: Oakwood Avenue (State Route 40) which runs along the top of the dam; and a residential area of the City of Troy, with many dwellings, about 2000 feet downstream of the dam (vertical drop from the dam to this residential area is about 200 feet).

e. Ownership

The dam was originally constructed in about 1861 by the City of Troy. The dam and reservoir are presently owned by:

City of Troy
City Hall
Monument Square
Troy, New York 12180

Attn: Mr. John P. Buckley, City Manager
(518) 270-4401

f. Operator

No one is responsible for the day-to-day operation of the dam. The dam appurtenances have not been operated for many years. Operation of the dam when it was used was the responsibility of:

City of Troy
Department of Public Utilities
55 Leversee Road
Troy, New York 12182

Attn: Richard W. Casey, Commissioner
(518) 270-4500

g. Purpose of Dam

The dam was originally constructed to impound water for use as a public water supply for the City of Troy. It was abandoned as a water supply in 1916. The lake is presently used for recreational (aesthetic) purposes and is now part of Frear Park in Troy.

h. Design and Construction History

The present dam is a modification and reconstruction of an older road embankment and culvert at the site which originally did not impound water. It is believed that in 1861 the Water Works Superintendent designed the present dam. Reportedly, the dam was constructed in 1861 under the "charge of the Superintendent" of the Water Works and not by contract.

In 1880 the southeast bank of the reservoir (opposite the dam) was paved with "large cobble stones". In 1884 the dam (and road across the dam) was raised an average of three feet and the slopes of a portion of the reservoir were graded and filled. Sometime in the mid-1960's the Owner burned down the gate house over the drop inlet and gate chamber. In 1977 a trash rack (chain link fence) was placed over the top of the drop inlet and gate chamber.

There is no knowledge or record of other construction modification or major repair to the dam. Refer to Section 2 of this report, as well as to the Engineering Data Checklist in Appendix F2, for a complete discussion of the design and construction history. Other engineering data is included in Appendices F3 and G.

i. Normal Operating Procedures

The dam has not been operated in many years. All of the slide gates on the control tower (gate chamber and drop inlet structure) are in a state of disrepair and are believed to be inoperable. Water flows freely over the spillway crest and leaks in between the bricks and capstones of the tower. Because of this leakage, the water level is sometimes lower than the spillway crest. All of the slide gates on the upstream side of the tower are presently closed, as they are normally.

1.2 PERTINENT DATA

a. Drainage Area (square miles) — 2.81

b. Discharge at Dam Site (cfs)

Drop Inlet Spillway (W.S. at top of dam)	590
Following outlets are normally closed and presently inoperable:	
Outlet Gates	Insufficient Data to Estimate
Low Level Outlet (estimated potential w/W.S. at spillway crest)	125
Maximum Known Flood	Unknown

c. Elevation (feet - NGVD)

Based on USGS mapping, the elevation base used on the bathymetric map of the reservoir dated June 1894 (see Appendix G-1) is about 0.6 of a foot higher than NGVD (National Geodetic Vertical Datum of 1929). Therefore, all elevations used in this report are 0.6 of a foot lower than those found on the bathymetric map in Appendix G and are in feet above mean sea level NGVD.

Top of Dam (low end on right)	241
Design High Water	Unknown
Drop Inlet Spillway Crest	238
Entrance Invert of Outlets	
Outlet Gates	No Data
Low Level Outlet	210 ±

74 d. <u>Reservoir Length</u> (feet) - at spillway crest 1200 ±

e. <u>Reservoir Surface Area</u> (acres)

Top of Dam	9 ±
Spillway Crest	7.6

f. <u>Reservoir Storage</u> (acre-feet)

Top of Dam	129
Spillway Crest	105

g. <u>Dam</u>

<u>Type</u> - Earth Embankment with impervious core.
Length - About 350 feet.
Height - About 46 feet.
Top Width - Averages 54 feet (includes 34-foot paved roadway).
Side Slopes - Upstream - About 2H:1V
 - Downstream - About 1.6H:1V
Zoning - Unknown.
Impervious Core - Puddle wall consisting of "clay and sand"; 20 feet wide at base of dam tapering to 16 feet wide at the original top of the dam, which is about 3 feet lower than the present top.
Cutoff - Impervious core extends "several feet below the natural surface of the ground" and rests on "solid foundation".
Grout Curtain - Unknown.

h. <u>Spillway</u>

<u>Type</u> - Drop inlet spillway, consisting of about a 6.5-foot by 10.5-foot rectangular clear opening riser shaft followed by a brick masonry , stone masonry, and concrete outlet conduit about 170 feet long. Brick masonry portion is oval, about 4.5 feet wide by 8.5 feet high and about 40 feet long. Stone masonry portion is arch-shaped, about 6 feet wide by 9 feet high and about 100 feet long, with a brick lining about 3 feet high. Concrete portion is rectangular, about 6 feet wide by 9.5 feet high and about 30 feet long.
Length of Weir - About 34 feet.
Upstream Channel - Reservoir all around drop inlet.
Downstream Channel - Flat channel, with a pool at conduit end, forming the natural channel of the Piscawan Kill.

67 8 i. <u>Outlet Works</u>

1) <u>Outlet Gates</u>
<u>Size - Each</u> of 3 ports 2 feet wide by 2.5 feet high.

Description - 3 ports at different elevations through the upstream wall of the gate chamber, and an opening of some kind through the downstream wall of the gate chamber into the drop inlet shaft.

Control - Cast iron gate on upstream side of each port with operating stem up outside of gate chamber. Type of control, if any, on opening from gate chamber to drop inlet is unknown. Only two gate stems observable and all gates are believed inoperable.

2) <u>Low Level Outlet</u>

Size - 2 feet wide by 2.5 feet high.

Description - Port through bottom of upstream wall of gate chamber.

Control - Planked shut. Any flow has to go through the opening from the gate chamber to the drop inlet shaft, and details of the opening are unknown.

SECTION 2

ENGINEERING DATA

2.1 DESIGN DATA

a. Geology

There was no geologic information available in the design data for this dam. The following information was obtained from current geologic maps and publications for this region (References 26, 27, and 28) as well as from the site visit.

Wright Lake Dam is located on the western border of the Taconic Section of the New England Province. Regional geologic bedrock maps show that between Wright Lake Dam and Bradley Lake Dam, which is immediately upstream, there is a thrust or reverse fault which trends north-south, roughly perpendicular to the east-west trend of the valley. The map indicates that the bedrock under Wright Lake Dam is the Normanskill Formation, which is of Middle Ordovician age and consists of siltstone and shale. Surficial geology maps indicate that the overburden soils at the dam site consist of the blue-gray and chocolate rhythmic clays known as the Lake Albany clays.

b. Subsurface Investigations

No records of subsurface investigations for this site are available.

c. Dam and Appurtenances

The dam is believed to have been designed in 1861 by the City of Troy Water Works Superintendent at that time. The only records available concerning the design of the dam were excerpts from the City of Troy Water Commissioners Reports of 1862 (see Appendices F3-1 and F3-2). Also available was a bathymetric map of the reservoir done in June 1894 (see Appendix G-1).

2.2 CONSTRUCTION HISTORY

a. Initial Construction

Prior to construction of the dam, a road embankment (Oakwood Avenue) with a stone masonry arch culvert at the bottom was located at the dam site. This embankment was modified and enlarged in 1861 and became what is today known as Wright Lake Dam. The culvert through the embankment was repaired and added to and became the outlet conduit from the drop inlet spillway which was constructed for the dam. Appendices F3-1 and F3-2 are excerpts from City of Troy Water Commissioners Reports of 1862 which describe the construction. The construction of the dam was performed under the "charge of the Superintendent" of the Water Works and not by contract.

No drawings or other data concerned with the original construction could be found. A brief review of the known construction history, as can be determined from the available data and the Owner, can be found on Appendix F2-2.

b. Modifications, Repairs, and Maintenance

Excerpts from the City of Troy Water Commissioners Reports (see Appendices F3-3 to F3-5) describe some early modifications to the dam. In 1880 the southeast bank of the reservoir (not the dam) was paved with "large cobble stones" for slope protection. This bank is roughly opposite the dam and is just downstream of an upstream dam, Bradley Lake Dam.

In 1884 the dam was raised an average of 3 feet due to the regrading of Oakwood Avenue. Reportedly, "over 1,400 yards of gravel" were used (see Appendix F3-5). The southern and eastern slopes of the reservoir were also graded and filled at this time.

According to the Owner the wooden gate house over the drop inlet and gate chamber was burned down in the mid-1960's by the City. A photo on Appendix F3-10 shows the gate house as it existed in 1921.

Around 1973 the concrete roadway (Oakwood Avenue) across the dam was resurfaced with blacktop by the City of Troy Department of Public Works.

In 1977 a trash rack of 2 by 4 lumber and chain link fence was placed over the top of the drop inlet and gate chamber.

c. Pending Remedial Work

There are no known plans for any remedial work at the dam.

2.3 OPERATION RECORD

a. Inspections

There is no known record of inspection of the dam by the Owner.

A State of New York Conservation Commission Dam Report dated June 20, 1921 (see Appendix F3-6) describes the dam as "in good condition." Appendix F3-10 is a photo of the dam from upstream taken during this inspection.

75 An inspection report dated August 12, 1970 by the NYS-DEC (see Appendix F3-11) noted that problems with concrete surfaces and joints could be covered by periodic maintenance.

An inspection report dated December 8, 1970 by the NYS-DEC (see Appendix F3-14) indicated that the dam and appurtenances were in satisfactory condition but that there was no evidence of periodic maintenance being performed. The report also noted that a "protective cover" was needed over the drop inlet to replace the non-existant gate house. (The August 12 and December 8 inspection reports may describe the same inspection with a day-month transposition error of 12/8 for 8/12, or vice versa.)

An inspection report dated April 28, 1978 by the NYS-DEC (see Appendix F3-16) and a letter sent to the Owner concerning that inspection (see Appendix F3-17) indicated that the dam had several deficiencies. Tree growth on the downstream slope as well as the lack of an emergency spillway (inadequate spillway capacity) were noted. The dam was evaluated as needing "repairs ... beyond normal maintenance."

b. Performance Observations

Other than the observations made in the various inspection reports and correspondence concerning the dam (see Appendix F3) there are no other known records of performance observations.

c. Water Levels and Discharges

There are no known records of water levels or discharges at the dam.

d. Past Floods and Previous Failures

There are no known records of past floods at or previous failures of the dam.

2.4 EVALUATION

a. Availability

As listed on Appendix F1, various engineering data and records are available in the files of the Owner, the Dam Safety Section of the NYS-DEC, and the Division of Fish and Wildlife of the NYS-DEC. This data was reviewed, and copies of the records significant to the dam are included in chronological order in Appendices F3 and G. Appendix F2, Checklist for General Engineering Data and Interview with Dam Owner, also contains pertinent engineering information. A current pamphlet entitled "History of the Troy Water Works" was also available from the Owner and was useful, but it is not appended to this report.

39 b. Adequacy

Available data consisted of descriptions of the dam's construction and repairs from Troy Water Commissioners Reports, inspection reports, an old photo, correspondence, and bathymetric mapping of the lake. Such data as design/construction drawings, record drawings, specifications, design calculations, detailed data on foundation and embankment soils, and operation and performance data are not available. The lack of such in-depth engineering data does not permit a comprehensive review. Therefore, the available data was not adequate by itself to permit an assessment of the dam.

c. Validity

The elevation base of the bathymetric map (Appendix G-1) is about 0.6 of a foot higher than NGVD based on USGS mapping.

30

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General

Wright Lake Dam was inspected on May 6, 1981. The inspection party (see Appendix B-1) met two representatives of the Owner at the offices of the Troy Department of Public Utilities: Richard W. Casey, Commissioner, and Neil Bonesteel. The inspection party then proceeded to the dam site, without the Owner's representatives, and performed the inspection. The weather was overcast and warm during the inspection, with rain later in the afternoon. The water surface was at about EL 237 or about one foot below the spillway crest. The Visual Inspection Checklist is included as Appendix B, while selected photos taken during the inspection are included in Appendix A and as the Overview Photo at the beginning of this report. Appendix A-1 is a photo index map.

b. Dam

There is no evidence of any major sloughs or slides on the embankment.

Crest of Dam - There is a paved roadway, Oakwood Avenue (N.Y. Route 40), on the crest of the dam (see Photo A-2A). The pavement shows no signs of settlement, cracking, or horizontal movement that would indicate problems.

Upstream Slope of Dam - The upstream slope of the dam has a sparse cover of brush, coarse weeds, and grass, and there are two large trees on the slope at Station 2+40 near the right abutment (see Photo A-2B). There are remnants of riprap at the water level and there are many irregularly dumped pieces of broken concrete slabs on the slope above the water level (see Photo A-3A). The riprap and dumped slabs do not provide adequate erosion protection and erosion is occurring at several locations along the length of the upstream slope (for example, see Photo A-3B). Near the left end of the dam there is a 9-inch tree stump about 4 feet above the reservoir level.

Downstream Slope of Dam - The downstream slope of the dam is about 1.6H:1V, which, for a dam of this height (about 46 feet), is considerably steeper than that of similar dams designed in accordance with modern standards of practice. No clearly defined slumps or slides were observed, but the surface of the slope is quite irregular (see Photo A-4A).

30 There are several minor erosion channels on the downstream slope, and one major erosion channel about 5 feet deep near the right abutment apparently caused by discharge from a highway drain pipe (see Photo A-4B). There are trees, brush, logs, and large rocks and pieces of broken concrete on the downstream slope (see Photo A-5A). The area next to the downstream toe between the left abutment and the spillway outlet conduit is slightly wet and soft, but there is no standing or free flowing water on the surface. It is not possible to determine on the basis of the visual inspection alone whether this condition is due to seepage from the reservoir or natural groundwater discharge from the left bank of the downstream channel.

Abutments - Both abutments appear to be soil. No bedrock outcrops were observed in the vicinity of the abutments.

c. Appurtenant Structures

1) Control Tower, Drop Inlet Spillway, and Regulating Outlets

The control tower consists of a gate chamber shaft on the upstream side and a drop inlet spillway shaft on the downstream side (see Photo A-5B). The brick masonry structure has a concrete inner lining, with concrete cross-bracing in the drop inlet shaft. The observable portion of structure is in poor condition. The brick masonry is chipped, broken, and missing on both the inside and outside of the tower. The concrete surfaces have surface erosion. The capstones (or stone coping) along the crest of the structure are out of alignment, with one stone displaced entirely from the spillway crest and held in place by a bent anchor bolt (see Photo A-6B). There is also leakage into the tower between the joints of the brick masonry and capstones.

The regulating outlets consist of 4 gates at different levels on the upstream side of the gate chamber, as well as a port with a possible control mechanism between the bottom of the gate chamber and the drop inlet shaft. Photo A-6A shows 2 gate stems for gates on the upstream side of the tower. The third gate should have an operating stem, which was not visible, whereas the fourth "gate" at the bottom (the low level outlet) is reportedly just an opening planked shut (see description of original design on Appendix F3-2). All of the gates on the upstream side of the gate chamber, as well as the possible control mechanism on its downstream side, have not been operated in many years and are believed to be inoperable. None of the gates were visible for inspection.

2) Spillway Outlet Conduit and Discharge Channel

The spillway outlet conduit is a brick masonry oval section at its upstream end (see Photo A-7A), a stone masonry arch

30 section in the middle (see Photo A-7B) and a concrete box section at its downstream end (see Overview Photo). The conduit is in fair condition. The brick masonry at the upstream end near the drop inlet spillway shaft is eroded and spalled, especially on the left side. The stone masonry portion has some broken stones and missing mortar in the lower third of the conduit. The brick lining in the lower area of the stone masonry is badly deteriorated and worn (see Photo A-7B). A concrete patch, about 5 feet square, has been made to the stone masonry on the right side, just upstream of the concrete box section. The concrete of the box section has some efflorescence, staining, and encrustation. The downstream end of the conduit is undermined by as much as 3 feet and there is some deterioration of the concrete on the left downstream end (see Photo A-8A).

d. Reservoir Area

No evidence was observed to indicate problems of slope instability on the perimeter of the reservoir or of significant sedimentation in the reservoir (see Photos A-5B, A-9A, and A-9B).

e. Downstream Channel

There is about a 25-foot-square ponding area in the Piscawan Kill immediately downstream of the spillway outlet conduit (see Photo A-8B). The stream channel then becomes a heavily brushed and wooded channel. The Piscawan Kill is piped further downstream, where it flows through developed areas of the City of Troy.

3.2 EVALUATION

The downstream slope of the dam is steeper than that of similar dams designed in accordance with modern standards of practice and should be evaluated to determine whether it has an adequate factor of safety against failure.

The lack of erosion protection on the upstream slope of the dam makes the slope susceptible to erosion.

Trees growing on the downstream and upstream slopes of the dam could lead to seepage problems and piping (internal erosion) of the embankment if any of the trees blow over and pull out their roots or if any of the trees die and their roots rot. Stumps on the upstream and downstream slopes can also lead to seepage and piping problems when their roots rot.

30 A soft, wet area exists next to the downstream toe of the dam between the left abutment and the spillway outlet conduit. Because it is not possible to determine whether this condition is due to seepage from the reservoir or to a natural discharge of groundwater

from the left side of the valley, an investigation should be made to determine the cause and, if needed, to design appropriate remedial measures.

The deteriorated structural condition of the control tower (drop inlet and gate chamber) could lead to a partial failure of its top, which could block the drop inlet spillway shaft or conduit and cause overtopping of the dam.

Since the regulating outlets do not appear operable, it is impossible to regulate lake levels and it would be difficult to drain the lake.

Undermining of the downstream end of the spillway outlet conduit could lead to its failure, which would threaten the stability of the embankment. Also, minor deterioration of some of the concrete at the end of the conduit, if not repaired, will continue and eventually weaken the structure.

Deterioration of some of the masonry inside the spillway outlet conduit could, in time, weaken the conduit and thereby threaten the embankment.

SECTION 4

OPERATION AND MAINTENANCE PROCEDURES

4.1 OPERATION PROCEDURES

There are no operation procedures for the dam.

Wright Lake is presently just used for recreational (aesthetic) purposes. The water level is normally at or below the spillway crest. All gates on the upstream side of the gate chamber are normally closed and have not been operated in many years. Leakage between the bricks and capstones of the gate chamber and drop inlet structure causes the water level to be lower than the spillway crest at times.

At the time of the May 6, 1981 inspection the lake level was about one foot lower than the spillway crest due to leakage into the structure.

4.2 MAINTENANCE OF DAM AND OPERATING FACILITIES

There are no written maintenance procedures for the dam.

The use of Wright Lake as a source of water supply by the City of Troy was discontinued in 1916. The operating facilities at the dam are presently in a state of disrepair, appear to be inoperable, and have not been used in many years.

The only regular maintenance performed on the dam is the cutting of brush on the upstream slope by the City of Troy Department of Parks and Recreation. The paved road across the crest, Oakwood Avenue, is maintained by the City of Troy Department of Public Works. No other regular repairs or periodic maintenance of the dam or appurtenances occurs.

4.3 EMERGENCY ACTION PLAN AND WARNING SYSTEM

There is no emergency action plan and warning system for the dam.

4.4 EVALUATION

Maintenance of the dam and appurtenances is unsatisfactory. There has been no significant maintenance or repair of the dam and its appurtenances in recent years. Effective operation and maintenance procedures, as well as plans for repairs, need to be developed and implemented in order to avoid the continued deterioration of the dam.

The Owner should develop an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

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SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 DRAINAGE AREA CHARACTERISTICS

Wright Lake Dam and Wright Lake are located on the Piscawan Kill, a tributary of the Hudson River in eastern New York. The dam is located about 4000 feet upstream from the tributary's confluence with the Hudson River.

The total drainage area at the dam is 2.81 square miles, of which about 0.012 square miles (7.6 acres), or only about four-tenths of one percent, is the surface of Wright Lake at its spillway crest. The topography of the drainage area is characterized by slopes of 10% to 20%. Elevations in the drainage area vary from EL 238 to EL 1190. (See Appendices C-5 and C-6.)

About 1000 feet upstream of the dam there is another impoundment of about the same size known as Bradley Lake (about 8 acres). Since Bradley Lake has a total drainage area of 2.70 square miles, it regulates about 96% of the total drainage area of Wright Lake Dam. Bradley Lake Dam, NY 00755, is covered by a separate Phase I Inspection Report.

About 2.3 miles upstream of the dam there is a major impoundment known as Troy Reservoir (about 52 acres). Since Troy Reservoir has a total drainage area of 1.58 square miles, it regulates about 56% of the total drainage area of Wright Lake Dam. Troy Reservoir is actually two impoundments that act as one because they are connected by two large uncontrolled culverts under the earth berm that separates them. The berm is known as Brunswick Reservoir Dam, NY 00114, and the lower or main dam is Vanderheyden Reservoir Dam, NY 00116. There is no Phase I Inspection Report for either of these dams.

5.2 ANALYSIS CRITERIA

The U.S. Army Corps of Engineers Hydrologic Engineering Center's Program HEC-1 DB (Reference 3) was used to develop the test flood hydrology and perform the reservoir routing.

The purpose of this analysis was to evaluate the dam and spillway with respect to their surcharge storage and spillway capacity. Accordingly, it was assumed that the water surface was at the drop inlet spillway crest at the start of the flood routing. The gates into the bottom of the gate chamber/drop inlet structure were all assumed to be closed, as they are normally.

99 A constant base flow of 2 cfs per square mile was chosen to represent average conditions in the drainage area and was inputted into the program for all subareas.

The index PMP (probable maximum precipitation) inputted to the HEC-1 DB program was 19.5 inches for a 24-hour duration all-season storm over a 200-square-mile basin, according to HMR 33 (Reference 4). Maximum 6-hour, 12-hour, 24-hour, and 48-hour precipitation for the actual size of the drainage area (same for 10 square miles or less) were inputted to the program as percentages of the index PMP in accordance with HMR 33. A storm reduction coefficient was then applied internally by the program in order to transpose or center the storm over the actual total drainage area. Thus, the corrected 48-hour PMP for the actual total drainage area became 22.3 inches. All rainfall was distributed using the Standard Project Storm arrangement embedded in the program.

Appendices C-7 to C-9 summarize the subarea, loss rate, and unit hydrograph data inputted to the program. Six subareas were used to model the drainage area. Subarea 1 consists of all the drainage area around Troy Reservoir, and Subarea 2 consists of just the surface of Troy Reservoir. Subarea 3 consists of all the drainage area tributary to Bradley Lake, excluding Subareas 1 and 2. Subarea 4 consists of the surface of Bradley Lake. Subarea 5 consists of all the drainage area tributary to Wright Lake, excluding the 4 upstream subareas. Subarea 6 consists of just the surface of Wright Lake. All the area tributary to Bradley Lake Dam, Subareas 1 through 4, was modeled in the same way as in the separate Phase I Inspection Report for Bradley Lake Dam, NY 00755.

For the land in Subareas 1, 3, and 5 the loss rates were assumed to be 1.0 inch initially and a constant 0.1 inch per hour thereafter. A Snyder unit hydrograph basin coefficient was assumed for average conditions and a Snyder peaking coefficient was chosen from the 1976 Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models (Reference 20). A conservative standard lag time was computed. The program uses the inputted lag time and Snyder peaking coefficient to solve by iteration for approximate Clark coefficients, which are then used to calculate the runoff hydrograph.

For the reservoir surfaces making up Subareas 2, 4, and 6 loss rates were set to zero so that rainfall would equal rainfall excess, or runoff. Assuming no delay in the rainfall/runoff response, a constant unit hydrograph for a rainfall duration equal to the HEC-1 DB calculation interval was developed per Appendices C-7 to C-9 and inputted to the program for each reservoir.

39 Flows were routed through Subarea 2, Troy Reservoir, and Subarea 4, Bradley Lake, using the HEC-1 DB program in the same way as for Wright Lake and using the same data as in the separate Phase I Inspection Report for Bradley Lake Dam, NY 00755. The development

of elevation-storage and discharge data is shown on Appendices C-10 and C-11 for Troy Reservoir and on Appendices C-12 to C-16 for Bradley Lake. For both Troy Reservoir and Bradley Lake routing was started with the water surface at the spillway (or service spillway) crest and the outlet works were assumed closed. Bradley Lake Dam has a culvert service spillway and a drop inlet auxiliary spillway.

Flow from Troy Reservoir was routed through Subarea 3 to Bradley Lake by the HEC-1 DB program using normal depth channel routing the same as in the separate Phase I Inspection Report for Bradley Lake Dam, NY 00755. The inputted typical cross sections defining the channel reaches were developed from and are located on the Drainage Area Map, Appendix C-5. Hand plottings of the cross sections are included as Appendices C-17 to C-18.

Flow from Bradley Lake to Wright Lake was not channel routed or lagged because Bradley Lake discharges directly into Wright Lake.

The floods selected for analysis were the PMF (probable maximum flood) and 1/2 PMF. Floods as ratios of the PMF (e.g., 1/2 PMF) were taken as ratios of runoff, not of precipitation. Peak inflow to Wright Lake is about 5,600 cfs or 1,993 csm (cfs per square mile) for the PMF, and about 2,400 cfs (854 csm) for the 1/2 PMF. Peak outflows for both flood events are not reduced by reservoir routing and are the same as peak inflows.

5.3 RESERVOIR CAPACITY

Using a bathymetric map of the reservoir (see Appendix G-1), supplemented by USGS contour mapping above the spillway crest (see Appendix C-5), areas inside contour elevations were measured and the capacity of the reservoir was computed by the method of conic sections. The computations were done by the HEC-1 DB program. A hand tabulation of the input and the computed results is on Appendix C-19.

300 At the spillway crest, EL 238, the reservoir has a capacity of 105 acre-feet. At the top of dam (low end), EL 241, the reservoir has a capacity of 129 acre-feet. Surcharge storage between the spillway crest and the top of dam amounts to 24 acre-feet, or only about 0.2 of an inch of runoff from the 2.81-square-mile drainage area. Therefore, the reservoir has essentially no capacity to attenuate peak inflow.

5.4 SPILLWAY CAPACITY

The dam has a drop inlet spillway with a total weir length of about 34 feet. The oval outlet conduit from the drop inlet spillway is about 4.5 feet wide by 8.5 feet high at its upstream end.

The discharge capacity of the drop inlet spillway was computed assuming that its entrance acted as a sharp-crested weir up to the top of dam, EL 241. Above the top of dam flow through the spillway is controlled by the upstream end of the outlet conduit from the drop inlet. The spillway discharge computations are presented on Appendices C-20 and C-21. With water 3 feet over the spillway crest (i.e., water level at top of dam) the spillway discharges about 590 cfs.

For the spillway crest at EL 238 and the top of dam at EL 241, the total discharge computations are summarized on Appendix C-22. Total discharge from the dam is the discharge from the spillway plus flow over the dam for the overtopping condition. As discussed previously in Section 5.2, all of the gates into the bottom of the gate chamber/drop inlet structure were assumed closed, as they are normally. The hand-computed discharges for the spillway were inputted directly to the HEC-1 DB program.

With the lake level at the top of dam, EL 241, the total discharge from the dam is the capacity of just the drop inlet spillway, or about 590 cfs.

5.5 FLOODS OF RECORD

There are no known records of past flood discharges at the dam.

72 7

5.6 OVERTOPPING POTENTIAL

The results of the overtopping analysis using the HEC-1 DB program are summarized in Table 5.1. The overtopping analysis computer input and output for the PMF and 1/2 PMF are included starting on Appendix C-23.

As noted from Table 5.1, the PMF overtops the dam by about 2.7 feet maximum with duration of overtopping of about 9.5 hours. 1/2 PMF also overtops the dam but by about 1.3 feet maximum with duration of overtopping of about 8.2 hours. Peak inflows are 5,600 cfs for the PMF and 2,400 cfs for 1/2 PMF. For both flood events peak outflow is not reduced by reservoir routing and is the same as peak inflow. Time to maximum stage, or the time from the start of the 48-hour storm to peak outflow, is between 42 and 43 hours for both PMF and 1/2 PMF. The peak portion of the inflow and outflow hydrographs for the PMF and 1/2 PMF are shown by the computer plots on Appendices C-36 and C-37. Total project discharge capacity at the top of the dam is due to the drop inlet spillway (outlet works closed) and is about 590 cfs, or only about 11% of the PMF peak outflow and about 25% of the 1/2 PMF peak outflow.

It should be noted that Troy Reservoir Dam and Bradley Lake Dam are overtopped by both the PMF and 1/2 PMF (1.7 and 0.8 feet, respectively for Troy Reservoir, and 2.0 and 1.0 feet for Bradley Lake). Also, peak outflows are essentially not reduced by routing

TABLE 5.1

WRIGHT LAKE DAM

OVERTOPPING ANALYSIS

CONDITIONS

Total Drainage Area = 2.81 square miles, including Troy Reservoir and Bradley Lake and their drainage areas.
Start Routing at Spillway Crest EL 238
Top of Dam EL 241
Total Project Discharge Capacity at Top of Dam = 590 cfs ± due to spillway. Outlet works assumed closed.
Some values rounded from computed results.

		PMF	1/2 PMF[(a)]
INFLOW			
48-hour Rainfall (inches)		22.2	13.0[(b)]
48-hour Rainfall Excess (inches)[(c)]		18.5	9.3[(d)]
Peak Inflow	(cfs)	5,600	2,400
	(csm)	1,993	854
OUTFLOW			
Peak Outflow	(cfs)	5,600	2,400
	(csm)	1,993	854
Time to Peak Outflow (hours)		42.2	43.0
Maximum Storage (acre-feet)		153	140
Max. W.S. Elevation (feet-NGVD)		243.7	242.3
Minimum Freeboard (feet)		Overtopped	Overtopped
Maximum Depth over Dam (feet)		2.7	1.3
Duration of Overtopping (hours)		9.5	8.2

(a) One-half of PMF total runoff, including base flow. For PMF base flow = 2 cfs per square mile = 6 cfs ±
(b) Approximation assuming total losses are the same as for the PMF.
(c) Rainfall Excess = Rainfall for the Reservoir Surface. For the rest of the drainage area, losses are assumed to be 1.0 inch initially and 0.1 inch per hour thereafter.
(d) Equal to one-half of PMF value.

through either of these upstream reservoirs and are about the same as peak inflows (about 3,200 cfs for the PMF and 1,400 cfs for 1/2 PMF for Troy Reservoir, and about 5,400 cfs and 2,400 cfs for Bradley Lake). These results are shown in the computer output on Appendices C-32 to C-34.

5.7 EVALUATION

Maximum spillway discharge capacity (outlet works closed) is only about 11% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

75 SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

The following visual observations, which are discussed in detail in Section 3, are indicative of potential long-term stability problems at Wright Lake Dam:

1) Steepness of the downstream slope.

2) Erosion and lack of erosion protection on both the upstream and downstream slopes of the dam.

3) Trees and stumps on both the upstream and downstream slopes of the dam.

4) A soft, wet area next to the downstream toe of the dam between the left abutment and the spillway outlet conduit, which may or may not be due to seepage from the reservoir.

The downstream slope of the dam is about 1.6H;1V, which is considerably steeper than the downstream slope of similar dams designed in accordance with modern standards of practice. An analysis of the stability of the embankment should be made to determine whether it has an acceptable factor of safety against slope failure.

b. Design and Construction Data

The only design and construction data available were excerpts from old City of Troy Water Commissioners Reports which briefly describe the features and construction of the dam. These reports were discussed previously in Section 2 and are included as Appendices F3-1 to F3-5.

c. Operating Records

An inspection report dated April 28, 1978 by the NYS-DEC and a letter sent to the Owner concerning that inspection (see Appendices F3-16 and F3-17) noted that there were trees and brush growing on the downstream slope of the embankment and that this was an unacceptable condition.

75 d. Post-Construction Changes

The only major post-construction change appears to have been the raising of the dam crest (and Oakwood Avenue) about 3 feet in 1884, 23 years after the dam was constructed. This modification was discussed previously in Section 2.2b.

e. Seismic Stability

This dam is in Seismic Zone 2. According to the Recommended Guidelines (Reference 1) a seismic stability analysis is not required.

6.2 STABILITY ANALYSIS

A structural stability analysis is not required because there are no gravity structures at this dam to analyze.

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SECTION 7

ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Visual inspection of Wright Lake Dam revealed the following deficiencies which affect the safety of the dam:

1) Trees and stumps on both the upstream and downstream slopes.

2) A downstream slope of about 1.6H:1V, which is considerably steeper than that of similar dams designed in accordance with modern standards of practice and which may not have an acceptable factor of safety against failure.

3) Erosion and lack of erosion protection on both the upstream and downstream slopes.

4) A soft, wet area next to the downstream toe of the dam between the left abutment and the spillway outlet conduit, which may or may not be a potential problem.

5) Deteriorated structural condition of the drop inlet spillway and gate chamber structure.

6) Undermining of the downstream end of the spillway outlet conduit, and deterioration of some of the masonry inside the upstream reaches of the conduit.

Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 11% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

b. Adequacy of Information

Available information together with that gathered during the visual inspection, while considered adequate for this Phase I inspection, is deficient in the following respects:

1) The presence of brush on some parts of the downstream slope makes it impossible to inspect those areas adequately.

2) The trash rack (chain link fence) over the top of the gate chamber and drop inlet spillway, together with flowing water, makes it impossible to inspect the inside of those structures, as well as some areas inside the spillway outlet conduit, adequately.

c. Need for Additional Investigations

The following investigations should be performed by a registered professional engineer qualified by training and experience in the design of dams:

1) Perform a detailed hydrologic and hydraulic analysis to better assess spillway adequacy. This should include a more accurate determination of the site specific characteristics of the watershed.

2) Evaluate the stability of the embankment, with particular attention to the steepness of the downstream slope.

3) Investigate the soft, wet area next to the downstream toe of the dam between the left abutment and the spillway outlet conduit.

4) Investigate the structural deterioration and leakage into the gate chamber and drop inlet spillway structure and determine how repairs should be made. Major modifications to increase spillway capacity may be required depending on the results of the detailed hydrologic and hydraulic analysis.

d. Urgency

As recommended below in Section 7.2a, a program to visually inspect the dam at least once a month should be instituted immediately. As recommended below in Section 7.2b, development of a surveillance program and an emergency action plan should be completed within 3 months after receipt of this Phase I Inspection Report by the Owner. While the action plan is being developed, and within 3 months after receipt of this report by the Owner, the investigations recommended above in Section 7.1c should be started.

Any remedial work deemed necessary as a result of these investigations should be completed within 18 months after receipt of this report by the Owner.

Measures recommended below in Section 7.2c should be completed within 12 months after receipt of this report by the Owner.

7.2 RECOMMENDED MEASURES

The following work should be performed by the Owner. Where engineering assistance is indicated, the Owner should engage a registered professional engineer qualified by training and experience in the design of dams. Assistance by such an engineer may also be useful for some of the other work.

a. Complete Immediately

Institute a program to visually inspect - not just casually look at - the dam and its appurtenances at least once a month.

b. Complete Within 3 Months

Develop a surveillance program for use during and immediately after heavy rainfall or snowmelt, and also an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

c. Complete Within 12 Months

1) Reset the one capstone which is displaced and hanging from the crest of the drop inlet spillway.

2) Restore at least the lowest of the three outlet gates to operation. Also, clean and inspect the low level outlet port below the lowest outlet gate and verify that it can be opened by removing the planking which reportedly seals it. As an alternate, install an operating gate on the low level outlet. The outlet gate should be exercised regularly.

3) Temporarily repair the undermining of the downstream end of the spillway outlet conduit so as to remove a potential threat to the stability of the embankment. Major permanent repair or modification of the spillway outlet conduit, as well as repair of minor deterioration of some of the masonry along the barrel of the conduit and of some of the concrete at the downstream end, can wait until the need for additional spillway capacity has been fully evaluated by the detailed hydrologic and hydraulic analysis. Also, the detailed embankment stability investigation could affect the downstream end of the spillway outlet conduit.

4) Remove trees and brush and their root systems from the embankment and from a zone 50 feet wide next to the downstream toe in accordance with specifications and field observation of the work by an engineer. Backfilling the zones where stumps and

roots have been removed should be done with proper material and procedures. Continue to keep these same areas clear by cutting, mowing, and cleanup at least annually.

5) Repair erosion and provide erosion protection on the upstream and downstream slopes of the dam in accordance with design and field observation of the work by an engineer.

6) Develop and implement effective routine operation and maintenance procedures for the dam and its appurtenances.

7) Institute a program of comprehensive technical inspection of the dam and its appurtenances by an engineer on a periodic basis of at least once every two years.

d. Complete Within 18 Months

The following remedial work should be completed by the Owner. A qualified, registered professional engineer should design and observe the construction of the remedial work.

1) Appropriate modifications as a result of the detailed hydrologic and hydraulic analysis.

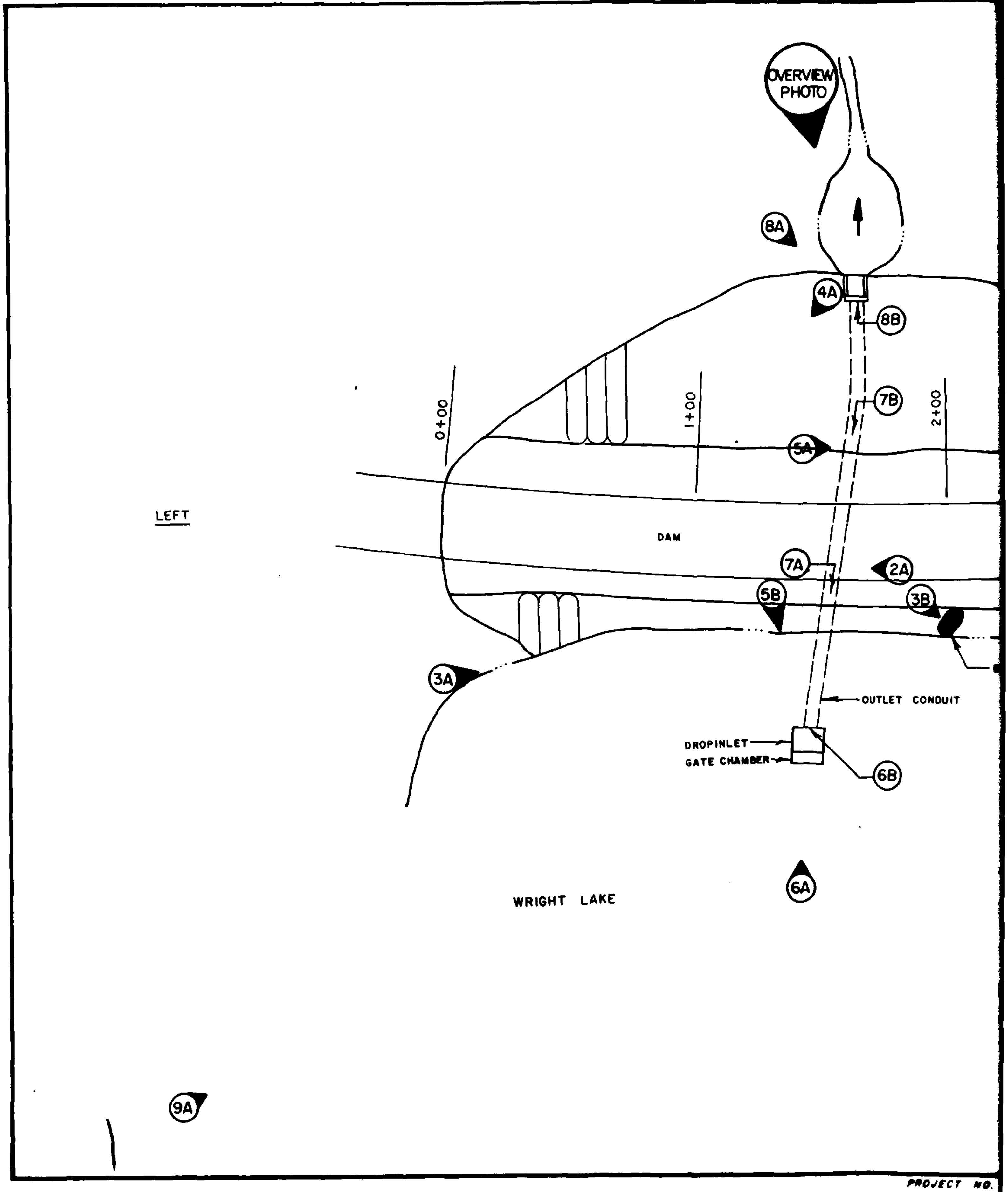
2) Appropriate modifications as a result of the stability investigation of the embankment.

3) Appropriate modifications as a result of investigating the soft, wet area next to the downstream toe between the left abutment and the spillway outlet conduit.

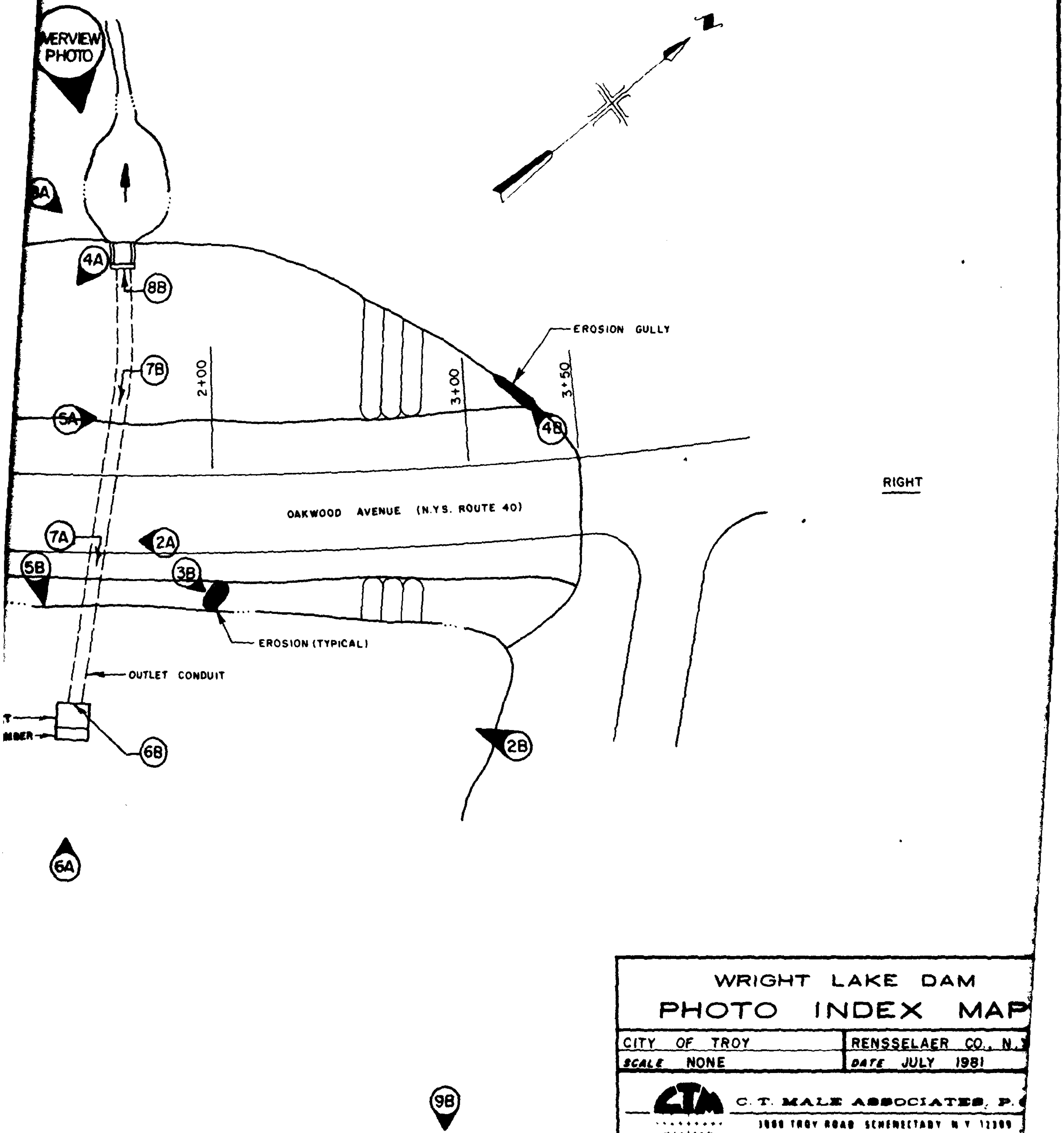
4) Appropriate modifications as a result of investigating the structural deterioration and leakage into the gate chamber and drop inlet spillway structure.

APPENDIX A

PHOTOGRAPHS


OVERVIEW PHOTO
8A
4A
8B
7B
0+00
1+00
2+00
5A
LEFT
DAM
7A
2A
5B
3B
3A
OUTLET CONDUIT
DROPINLET
GATE CHAMBER
6B
6A
WRIGHT LAKE
9A

PROJECT NO.



WRIGHT LAKE DAM

PHOTO INDEX MAP

CITY OF TROY	RENSSELAER CO., N.Y.
SCALE NONE	DATE JULY 1981

C. T. MALE ASSOCIATES, P.C.
3000 TROY ROAD SCHENECTADY N.Y. 12309
PROFESSIONAL ENGINEERS LAND SURVEYORS LAND PLANNING CONSULTANTS

PROJECT NO 58-01-00012/80.852

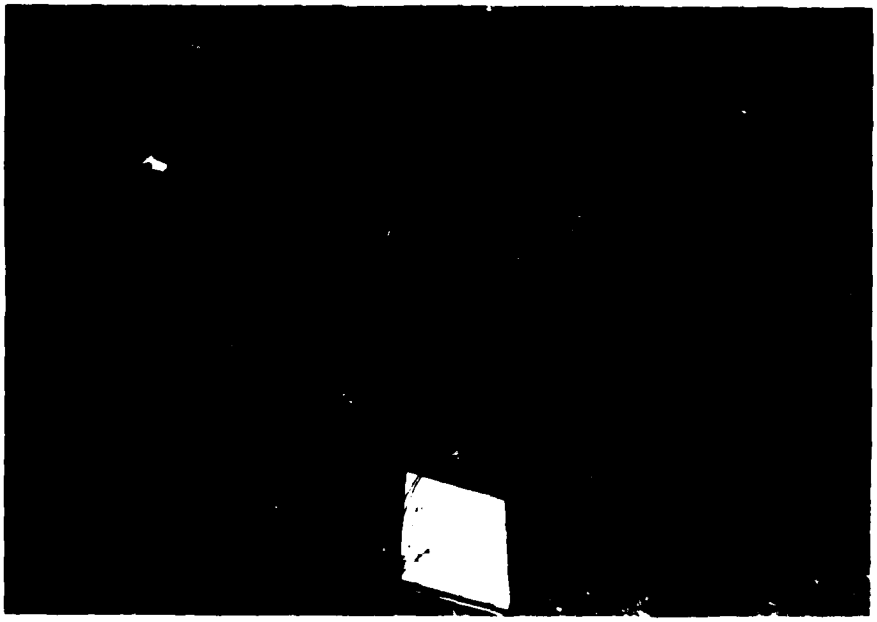
A-1

DWG. NO.

A-2A Top of dam from center of dam looking toward left abutment 5/6/81

A-2B Upstream slope of dam viewed from right abutment. Two large trees growing on upstream slope near Sta 2+40. Large pieces of concrete slabs dumped on upstream slope - 5/6/81

A-3A Upstream slope of dam viewed from left abutment - 5/6/81

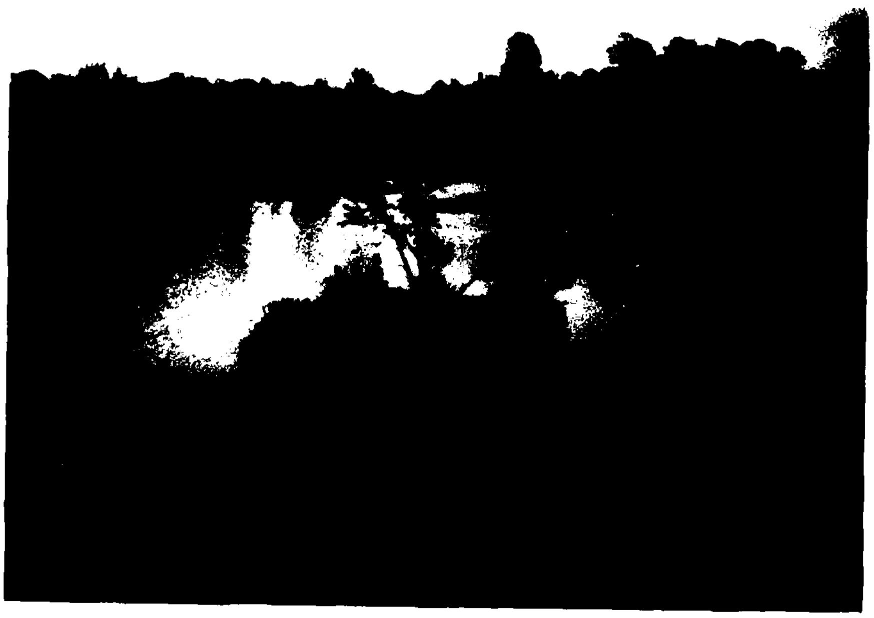


A-3B Erosion of upstream slope at Sta 2+00. Dumped piece of concrete slab obscured by wash material at bottom of photo 5/6/81

A-4A Dam looking upslope and toward left abutment from downstream end of spillway outlet conduit - 5/6/81

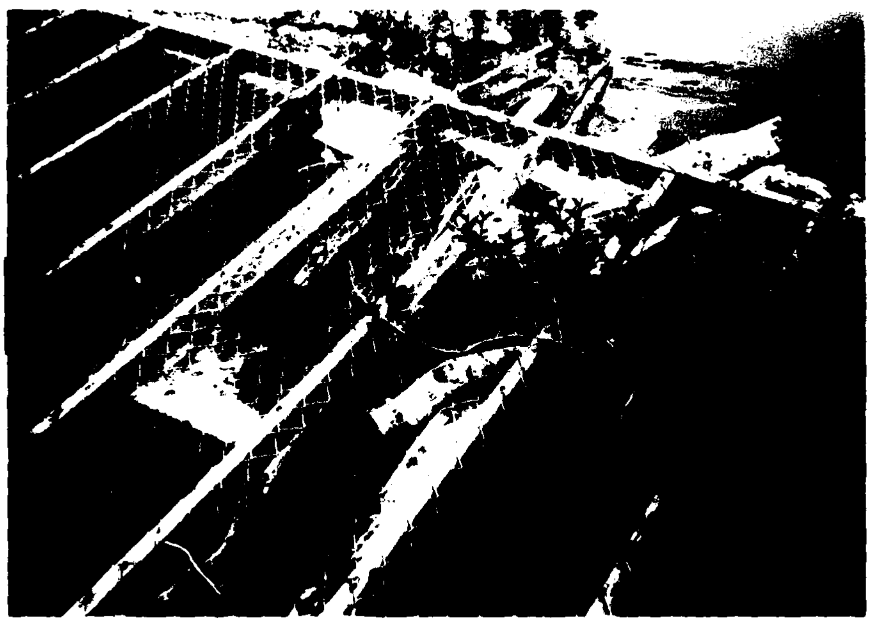
A-4B Major erosion gully, about 5 feet deep, on downstream slope at Sta 3+50 (approximately right abutment, which is not clearly defined for this dam). Flow causing erosion is from highway drain pipe at left in photo - 5/6/81

A-5A View along top of downstream slope from Sta 1+50 looking toward right of abutment - 5/6/81



A-5B Drop inlet (foreground) and gate chamber (background) looking from top of dam. Debris is at location of displaced capstone 5/6/81

A-6A Drop inlet and gate chamber looking from upstream. Note two gate stems at upstream side - 5/6/81



A-6B View of drop inlet weir at location of displaced capstone - 5/6/81

A-7A Inside of spillway outlet conduit looking at upstream end. Note oval brick section and transition to stone masonry with brick at bottom - 5/6/81

A-7B Close-up of stone masonry wall of spillway outlet conduit. Note deteriorated condition of brick near flow line - 5/6/81

A-8A Downstream end of spillway outlet conduit - 5/6/81

A-8B Downstream channel looking from top of spillway outlet conduit - 5/6/81

A-9A Overview of dam and lake looking from road above upstream shore - 5/6/81

A-9B Overview of Bradley Lake Dam looking across upstream end of Wright Lake - 5/6/81

APPENDIX B

VISUAL INSPECTION CHECKLIST

PHASE I

VISUAL INSPECTION CHECKLIST

1. BASIC DATA

a. General

Name of Dam Wright Lake Dam

Fed. I.D.# NY00757 DEC Dam No. 226A-143

River Basin LOWER HUDSON

Location: ~~Town~~ CITY TROY County RENSSELAER

Stream Name PISCAWAN KILL

Tributary of HUDSON RIVER

Latitude (N) 42° 44.9' Longitude (W) 73° 40.3'

Type of Dam EARTH

Hazard Classification HIGH

Date(s) of Inspection May 6, 1981

Weather Conditions OVERCAST, WARM W/ RAIN LATER IN THE AFTERNOON.

Reservoir Level at Time of Inspection EL 237
1' BELOW SPILLWAY CREST

b. Inspection Personnel (*Recorder) THOMAS BENNEDUM - CTM, EDWIN VOPELAK JR.* - CTM, RONALD C. HIRSCHFELD* - GEI

c. Persons Contacted (Including Title, Address & Phone No.)

RICHARD W. CASEY, COMMISSIONER, DEPT. OF PUBLIC UTILITIES
55 LEVERSEE RD., TROY, NY 12182 (518) 270-4500
NEIL BONESTEEL, DEPT. OF PUBLIC UTILITIES
(SAME ADDRESS AS R.W. CASEY) (518) 270-4510
DID NOT ACCOMPANY INSPECTION TEAM

d. History

Date Constructed 1861 Date(s) Reconstructed N/A

Designer WATER SUPERINTENDANT

Constructed By TROY WATER WORKS (CITY OF TROY)

Owner CITY OF TROY, CITY HALL, MONUMENT SQUARE, TROY, NY 12180 ATTN: JOHN P. BUCKLEY, CITY MANAGER

 Name of Dam Wright Lake Dam Date May 6, 1981

2. EMBANKMENT

a. Characteristics

GEI 1) Embankment Material Unknown. Gray silty sand and gravel is exposed on downstream slope. Tan silty sand and gravel is exposed on upstream slope.

GEI 2) Cutoff Type Unknown

GEI 3) Impervious Core Unknown

GEI 4) Internal Drainage System Unknown

GEI 5) Miscellaneous No comments

GEI b. Crest

GEI 1) Vertical Alignment Good.

GEI 2) Horizontal Alignment Good.

GEI 3) Lateral Movement No evidence of lateral movement observed.

GEI 4) Surface Cracks None observed.

GEI 5) Miscellaneous Paved highway on crest

GEI c. Upstream Slope

GEI 1) Slope (Estimate H:V) 2H:1V

GEI 2) Undesirable Growth or Debris, Animal Burrows Two large trees near right end of dam at Station 2+40. Brush and coarse weeds on most of upstream slope. Stump about 4 feet above reservoir level near left abutment.

GEI 3) Sloughing, Subsidence or Depressions Some erosion at several locations. No evidence of sloughing or subsidence observed.

GEI 4) Slope Protection Remnants of riprap at reservoir level. Irregularly dumped pieces of concrete slabs above reservoir level, but they are inadequate to provide erosion protection.

GEI 5) Surface Cracks or Movement at Toe None observed

GEI d. Downstream Slope

GEI 1) Slope (Estimate - H:V) 1.6H : 1V

GEI 2) Undesirable Growth or Debris, Animal Burrows Many large trees and some brush on slope.

GEI 3) Sloughing, Subsidence or Depressions Surface of slope is irregular, but there are no clearly defined slumps or slides. Some localized erosion channels, including one about 5 feet deep near the right abutment, apparently due to discharge from highway drain pipe.

GEI 4) Surface Cracks or Movement at Toe None observed

GEI 5) Seepage None observed

GEI 6) External Drainage System (Ditches, Trenches, Blanket)

None observed

GEI 7) Condition Around Outlet Structure Satisfactory

GEI 8) Seepage Beyond Toe Soft, wet area next to toe from left abutment to service spillway.

GEI e. Abutments - Embankment Contact

Abutments appear to be soil. No bedrock outcrops observed.

 Name of Dam Wright Lake Dam Date May 6, 1981

GEI 1) Erosion at Contact None observed

GEI 2) Seepage Along Contact None observed

3. DRAINAGE SYSTEM

GEI a. Description of System None observed.

GEI b. Condition of System Not applicable

GEI c. Discharge from Drainage System Not applicable

4. INSTRUMENTATION (Monumentation/Surveys, Observation Wells,
GEI Weirs, Piezometers, Etc.)
None observed

5. RESERVOIR

GEI a. Slopes Gentle slopes, partly brush-covered, partly grass-covered.

GEI b. Sedimentation No evidence of significant sedimentation observed.

GEI c. Unusual Conditions Which Affect Dam Bradley Lake Dam is immediately upstream of reservoir.

6. AREA DOWNSTREAM OF DAM

a. Downstream Hazard (No. of Homes, Highways, etc.) ABOUT 2000' D/S IS RESIDENTIAL AREA OF CITY OF TROY, MANY DWELLINGS.

GEI b. Seepage, Growth No seepage observed. Trees and brush growing immediately downstream of dam.

GEI c. Evidence of Movement Beyond Toe of Dam None observed.

d. Condition of Downstream Channel CLEAR AREA FOR ABOUT 25' D/S OF OUTLET CONDUIT, THEN HEAVILY BRUSHED + WOODED CHANNEL, PISCAWAN KILL IS PIPED AT D/S REACHES IN CITY

7. SPILLWAY(S) (Including Discharge Channel)

a. General DROP INLET SPILLWAY. DROP INLET IS D/S PORTION OF CONTROL TOWER MADE OF BRICK MASONRY + CONCRETE W/ LARGE CAP STONES. SHAFT OPENING ABOUT 6.5' X 10.5'. OUTLET CULVERT FROM BOTTOM OF SHAFT IS 170'± LONG WITH: BRICK MASONRY PORTION U/S 40' LONG, OVAL SHAPE 4.5' x 8.5'; STONE MASONRY ARCH PORTION NEXT 100' LONG, 6' x 9' W/ BRICK ALONG SIDES 3' HIGH; END IS CONC. BOX SECTION 30' LONG, 6' x 9.5'

b. Conditon of Service Spillway DROP INLET SHAFT - SEE APPURTENENT STRUCTURES (CONTROL TOWER) 10 a), ONLY TOP PORTION VISIBLE. OUTLET CONDUIT: BRICK PORTION - GOOD CONDITION. EXCEPT AT EXTREME U/S END NEAR DROP INLET SHAFT. IN THAT AREA, ON LEFT SIDE ESPECIALLY, BRICK IS ERODED + SPALLED. STONE MASONRY PORTION - GENERALLY GOOD CONDITION. SOME MORTAR MISSING ~~c. Condition of Auxiliary Spillway~~ + BROKEN STONES IN FLOW AREA. PARTIAL BRICK LINING HERE IS IN POOR CONDITION. BRICKS MISSING + BROKEN, MOTAR LOOSE. U/S 20'± OF LINING IS GOOD. ONE CONC. PATCH TO STONE MASONRY, 5' SQUARE AREA, U/S OF CONCRETE PORTION ON RIGHT CONCRETE PORTION - GOOD CONDITION W/ SOME EFFLORESCENCE, STAINING + ENCRUSTATION. SOME CONCRETE DETERIORATION @ D/S LEFT END. END OF CONCRETE CONDUIT UNDERMINED @ D/S END AS MUCH AS 3'

c. N/A

 Name of Dam Wright Lake Dam Date May 6, 1981

d. Condition of Discharge Channel CLEAR AREA 25' LONG BY 25' WIDE (MAXIMUM) AT D/S END OF SPILLWAY CONDUIT. WATER POOLS SOMEWHAT HERE BEFORE ENTERING TREE + BRUSH-CHOKED NARROWER NATURAL CHANNL D/S. IN PAST THERE WAS AN IMPOUNDMENT AT THIS LOCATION.

8.. RESERVOIR DRAIN/OUTLET

a. Type: Pipe____ Conduit ____ Other ✓ PORT OR OPENING BETWEEN GATE CHAMBER + DROP INLET SHAFT. CONTROL MECHANISM

b. Material: Concrete ____ Metal____ Other HERE - NOT OBSERVABLE.

c. Size: UNKNOWN Length____ } SEE H&H DATA

d. Invert Elevations: Entrance____ Exit____ } CHECKLIST, APPENDIX E

e. Physical Condition (Describe)

Unobservable ✓

1) Material ____

2) Joints ____ Alignment ____

3) Structural Integrity ____

4) Hydraulic Capability ____

f. Means of Control: Gate ✓ Valve____ Uncontrolled____

Operation: Operable ____ Inoperable ✓ Other ____

Present Condition (Describe) 3 GATES ON U/S SIDE OF VALVE CHAMBER AT VARIOUS ELEVATIONS. STEMS ON GATE APPEAR TO BE BROKEN OFF, GATES UNDERWATER + NOT VERY VISIBLE

g. Other Outlets (water mains, diversion pipes) ____

ALSO THERE IS SUPPOSED TO BE A LOWER PORT, PLANKED SHUT ON U/S SIDE OF GATE CHAMBER. IT WAS NOT VISIBLE.

0920 Name of Dam Wright Lake Dam Date May 6, 1981 7

9. STRUCTURAL

a. Concrete Surfaces CONCRETE FACING + BRACING INSIDE CONTROL TOWER (GATE CHAMBER + DROP INLET SHAFTS) HAS SOME SLIGHT EROSION DUE TO WATER ACTION. D/S END OF SPILLWAY - MINOR EFFLORESCENCE, STAINING + ENCRUSTATION

b. Structural Cracking NONE OBSERVED

c. Movement - Horizontal & Vertical Alignment (Settlement)

APPEARS OKAY

GEI d. Junctions with Abutments or Embankments

Not applicable.

GEI e. Drains - Foundation, Joint, Face

Not applicable.

f. Water Passages, Conduits, Sluices SEE SPILLWAY 7), RESERVOIR DRAIN/OUTLET 8), + CONTROL TOWER 10) 12" DIA CORRUGATED PIPE THROUGH DAM, INVERT AT ABOUT EL 241±. CULVERT IS FOR ROADWAY DRAINAGE.

GEI g. Seepage or Leakage Not applicable

 Name of Dam Wright Lake Dam Date May 6, 1981

h. Joints - Construction, etc.

APPEAR OKAY WHERE OBSERVABLE.

GEI i. Foundation Not applicable

GEI j. Abutments Not applicable

k. Control Gates SEE RESERVOIR DRAIN/OUTLET 8)

l. Approach & Outlet Channels RESERVOIR ALL AROUND DROP INLET & PONDING AREA 25' x 25' (MAX) AT D/S END OF SPILLWAY CONDUIT. WATER FROM GATE WOULD DISCHARGE THROUGH BOTTOM OF DROP INLET SHAFT INTO SPILLWAY CONDUIT

m. Energy Dissipators (Plunge Pool, etc.)

NONE.

n. Intake Structures

UNOBSERVABLE IN FRONT OF GATES. TRASH RACK OF 2" x 4" LUMBER & CHAINLINK FENCE OVER TOP OF DROP INLET & GATE CHAMBER (CONTROL TOWER)

o. Stability

p. Miscellaneous N/A

Name of Dam *Wright Lake Dam* Date *May 6, 1981*

10. APPURTENANT STRUCTURES (Power House, Lock, Gatehouse, Service Bridge, Other)

a. Description:

CONTROL TOWER - CONSISTS OF GATE CHAMBER U/S + DROP INLET SHAFT D/S. OLD GATE HOUSE ON TOP NO LONGER IN PLACE. BRICK MASONRY STRUCTURE W/ INNER WALL BETWEEN GATE CHAMBER + DROP INLET SHAFTS. DROP INLET SHAFT LINED WITH CONCRETE WALLS + HAS CONCRETE CROSS BRACES. STONE BLOCKS BOLTED IN PLACE W/ 1¼" STEEL BOLTS ALL AROUND TOP OF TOWER.

b. Condition:

GENERALLY IN POOR SHAPE FOR OBSERVABLE PORTION. BRICK MASONRY CHIPPED, BROKEN, + MISSING ON TOP INSIDE + OUTSIDE, CONCRETE OF TOWER OKAY W/ SOME SURFACE EROSION. CAP BLOCKS ARE OUT OF ALIGNMENT + ONE BLOCK 4' LONG HAS FALLEN OFF CREST INTO DROP INLET + HELD THERE BY BENT ANCHOR BOLTS, LEAKAGE INTO SHAFT BETWEEN BRICKS + CAP BLOCKS

11. MISCELLANEOUS MECHANICAL/ELECTRICAL EQUIPMENT

a. Description:

N/A

b. Condition:

12. OTHER

APPENDIX C

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

CHECKLIST AND COMPUTATIONS

TABLE OF CONTENTS

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PHASE I INSPECTION

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA CHECKLIST

Name of Dam WRIGHT LAKE DAM Fed. Id.# NY 00757

1. AREA-CAPACITY DATA

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
a. Top of Dam	241	8.7 EST.	129
b. Design High Water (Max. Design Pool)	UNKNOWN		
c. Auxiliary Spillway Crest	N/A		
d. Pool Level with Flashboards	N/A		
e. ~~Service~~ Spillway Crest	238	7.6	105

2. DISCHARGES

	Volume (cfs)
a. Average Daily	UNKNOWN
b. Spillway @ Top of Dam	590
c. Spillway @ Design High Water	UNKNOWN
d. Service Spillway @ Auxiliary Spillway Crest Elevation	N/A
e. Low Level Outlet (Normally planked shut. w/ W.S. at spillway crest est Q = 125 cfs)	0
f. Total (of all facilities) @ Top of Dam	590
g. Maximum Known Flood	UNKNOWN
h. At Time of Inspection May 6, 1981 W.S. @ EL 237 ±	UNKNOWN (leakage)

4596

3. TOP OF DAM

Elevation 241

a. Type EARTH

b. Width 54' ± Length 350

c. Spillover DROP INLET SPILLWAY

d. Location @ STA 1+50 ± IN RESERVOIR

4. SPILLWAY

SERVICE		AUXILIARY
a. 238	Elevation	N/A
b. DROP INLET	Type	
c. 6.5'x10.5' RECTANGLE 34' TOTAL WEIR LENGTH	Width	
	Type of Control	
d. ✓	Uncontrolled	
	Controlled:	
e.	Type (Flashboards; gate)	
f.	Number	
g.	Size/Length	
h. CUT STONE	Invert Material	
i.	Anticipated Length of Operating Service	
j. 170'± LONG OUTLET PIPE W/ U/S CONTROL SECTION 40'± LONG	Chute Length	
k. est. 15 to 30'	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	
l.	Other	

5. OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES

a. Type: Gate ✓ Sluice ____ Conduit ____ Penstock ____

b. Shape Rectangular

c. Size 2'W x 2.5'H 3 at diff. elevations are gated 1 at bottom (low level outlet) is planked shut

d. Elevations: Entrance Invert Low level estimated at EL 210 3 gated openings unknown

Exit Invert (same as entrance)

e. Tailrace Channel: Elevation N/A

6. FLOOD WATER CONTROL SYSTEM

a. Warning System None

b. Method of Controled Releases (mechanisms)

NONE OPERABLE

7. CLIMATOLOGICAL GAGES REFERENCES 21 + 22

a. Type NON-RECORDING PRECIPITATION & TEMPERATURE GAGE INDEX # 8600

b. Location TROY LOCK + DAM #2 LAT. 42°25', LONG. 73°41', 4,000' WEST OF DAM

c. Period of Record 1956 TO PRESENT

d. Maximum Reading UNKNOWN Date ____

8. STREAM GAGES (Reference 23)

a. Type WATER-STAGE RECORDER USGS GAGE # 01333500

b. Location LITTLE HOOSIC RIVER AT PETERSBURG, N.Y.

LAT. 42°45'30", LONG. 73°20'16", ~17 MILES EAST OF DAM

c. Period of Record JULY 1951 TO PRESENT (ALSO SOME SPOT RECORDS)

Drainage Area = 56.1 sm

d. Maximum Reading 7,470 cfs = 133.2 csm (FROM FLOOD MARKS) Date DECEMBER 31, 1948

9. OTHER

R 8/10/81

6169

10. DRAINAGE BASIN CHARACTERISTICS

a. Drainage Area 2.807 SQUARE MILES OR 1,797.1 ACRES

b. Land Use - Type Surburban & rural residential

c. Terrain - Relief Wooded & grassed slopes of 10 to 20%

d. Surface - Soil Glacial Till (?)

e. Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

NONE KNOWN.

f. Potential Sedimentation Problem Areas (natural or man-made; present or future)

NONE KNOWN.

g. Potential Backwater Problem Areas for Levels at Maximum Storage Capacity (including surcharge storage)

TOE OF BRADLEY LAKE DAM IS AT U/S END OF LAKE + COULD BE AFFECTED BY LEVELS @ MAXIMUM STORAGE CAPACITY

h. Dikes - Floodwalls (overflow & non-overflow) - Low Reaches Along the Reservoir perimeter

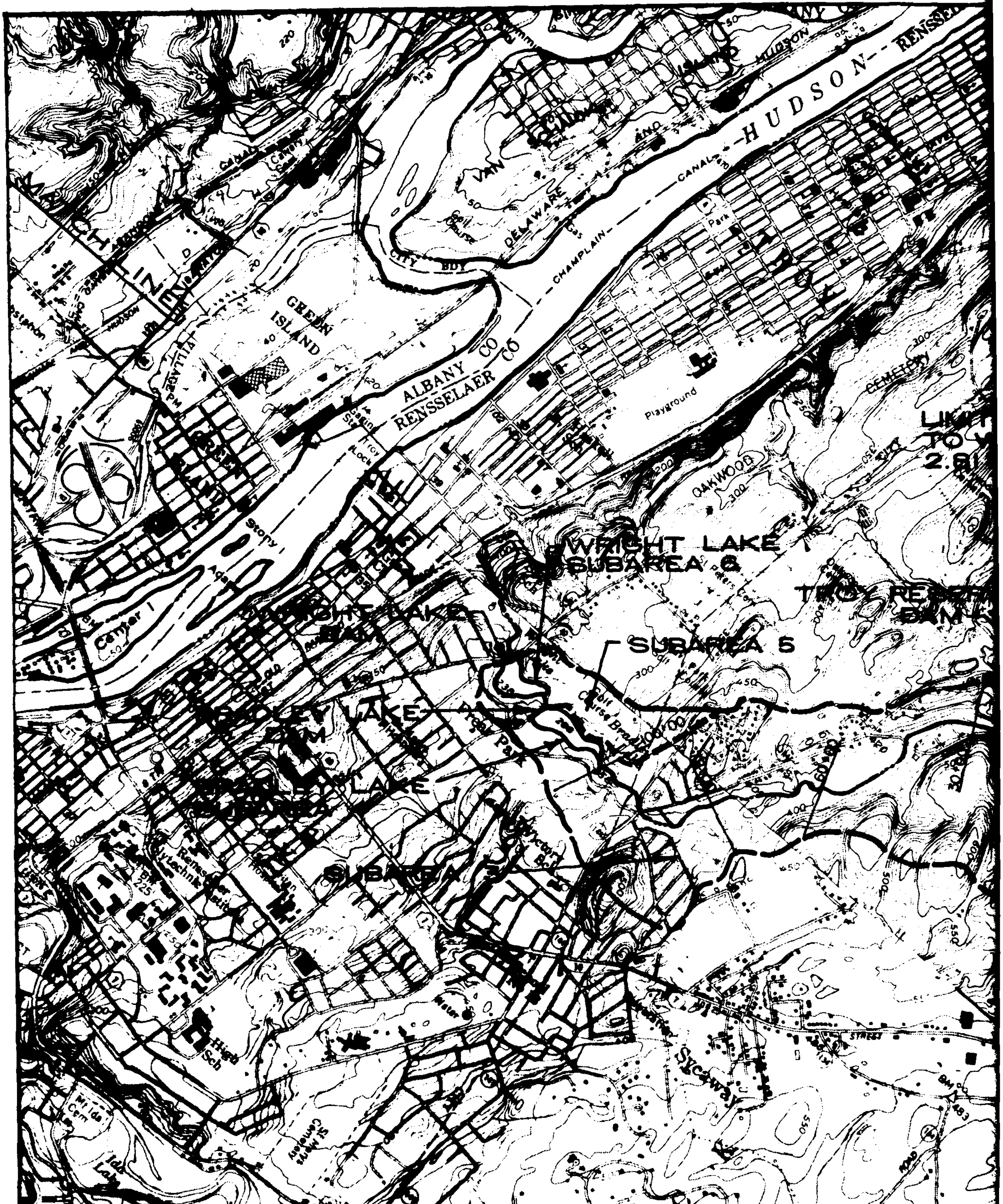
Location NONE.

Elevation

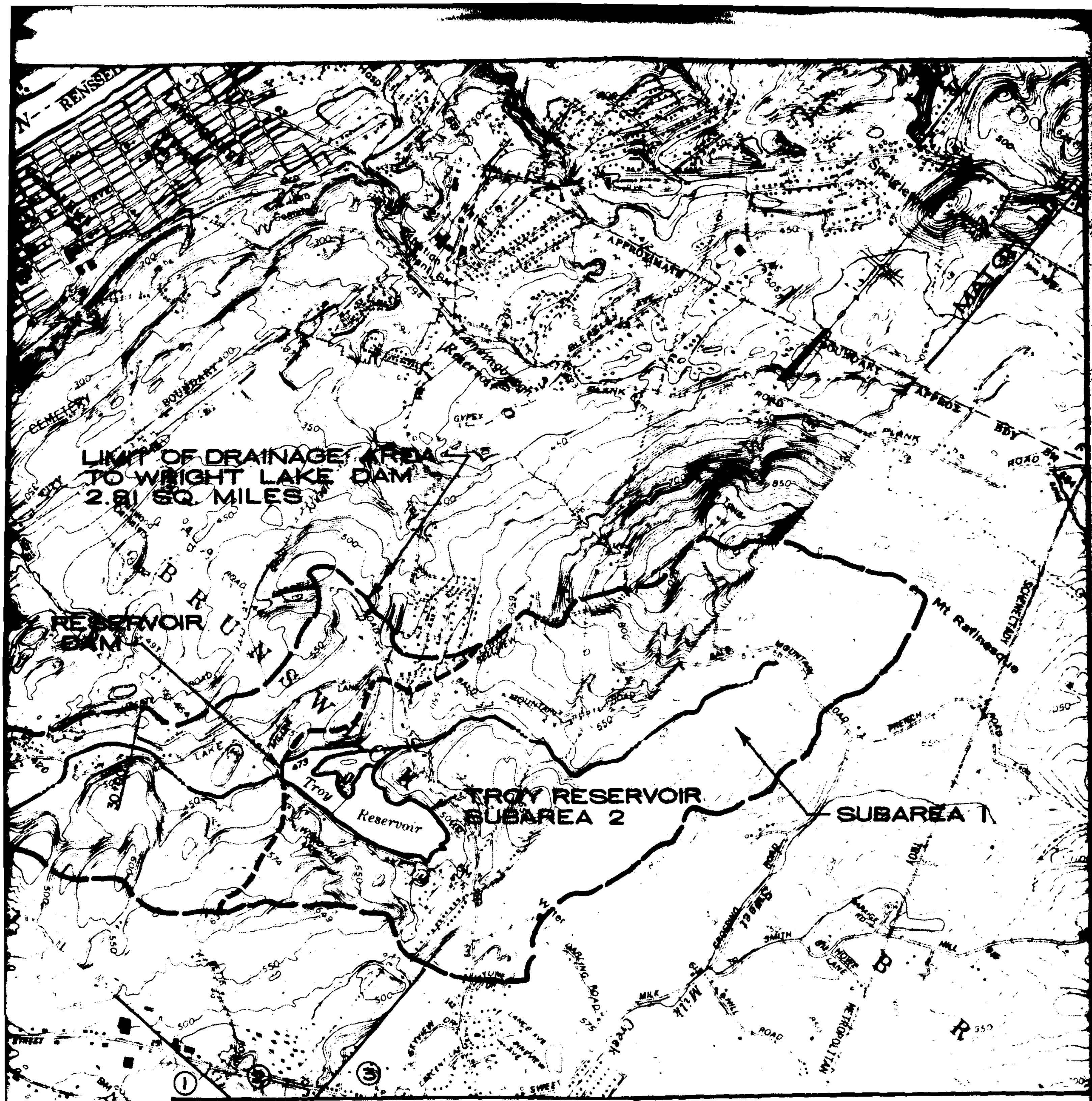
i. Reservoir

Length @ ~~Maximum Design~~ Spillway Crest Pool ~1,200 (feet)

Length of Shoreline (@ ~~Spillway~~ Spillway Crest) 72,900 (feet)



HUDSON
GREEN ISLAND
ALBANY CO
RENSSELAER CO
CHAMPLAIN
CANAL
DELAWARE
CITY BDY
Playground
OAKWOOD
CEMETERY
WRIGHT LAKE
SUBAREA 6
SUBAREA 5
SUBAREA 3
Golf Course
Rensselaer Polytechnic Institute
High Sch
Sycaway
St Mary's Cemetery
Mt Ida Cem
Ida Lake
New Mt Ida Cemetery



APPROXIMATE SCALE IN FEET
0 2000 4000

DATUM - NGVD 1929, 10' CONTOUR INTERVAL
BASE MAP - 7.5' NYSDOT TOPO QUADS
① TROY SOUTH, N Y - 1974
② TROY NORTH, N Y - 1974
- 7.5' USGS TOPO QUAD
③ TOMHANNOCK, NY - 1954

REVISED 8-10-81

WRIGHT LAKE DAM

DRAINAGE AREA MAP

CITY OF TROY	RENSSELAER CO., NY
SCALE: 1" = 2000'	DATE: JANUARY 1981

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3000 TROY ROAD, SCHENECTADY, N Y 12309

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PROFESSIONAL ENGINEERS LAND SURVEYORS LAND PLANNING CONSULTANTS
COMPUTER SERVICES LANDSCAPE ARCHITECTURE LABORATORY SERVICES

JOB WRIGHT LAKE DAM
SHEET NO ______ OF R 8/10/81
CALCULATED BY ELV DATE 5/20/81
CHECKED BY JPB DATE 7/21/81
SCALE 58.01.00012

DRAINAGE AREAS

	AREA (acres)		AREA (square miles)
WATERSHED DIRECT TO TROY RESERVOIR (SUBAREA 1)	960.8		1.501
TROY RESERVOIR SURFACE (SUBAREA 2) @ NORMAL POOL EL = 472 (See C-10)	52.1		.081
		1.582	
AREA ABOVE BRADLEY LAKE (SUBAREA 3)	706.0		1.103
BRADLEY LAKE SURFACE (SUBAREA 4) @ NORMAL POOL EL = 288 (See C-12)	83		.013
		2.698	
AREA ABOVE WRIGHT LAKE (SUBAREA 5)	62.3		.097
WRIGHT LAKE SURFACE (SUBAREA 6) @ NORMAL POOL EL = 238 (See C-19)	7.6		.012
TOTAL DRAINAGE AREA TO WRIGHT LAKE DAM	1,797.1		2.807

F--- CTM 405

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JOB: WRIGHT LAKE DAM
SHEET NO. ___ OF R 8/10/81
CALCULATED BY: ECV DATE: 5/20/81
CHECKED BY: GPB DATE: 7/13/81
SCALE: 5B.01.00012

DRAINAGE AREA DATA FOR HEC-1 DB MODEL

SUBAREA 1: AREA ABOVE TROY RESERVOIR, AREA = 1.501 SQ. MI.

LOSS RATES: 1.0" INITIALLY, 0.1"/HOUR - CONSTANT LOSS RATE

UNIT HYDROGRAPH PARAMETERS: USE SNYDER METHOD

A = DRAINAGE AREA = 1.501 SQ. MILES

L = LENGTH OF MAIN WATERCOURSE TO UPSTREAM LIMIT OF DRAINAGE AREA = 2.08 MILES

L_{CA} = LENGTH OF MAIN WATERCOURSE TO POINT OPPOSITE THE CENTROID OF THE DRAINAGE AREA = .80 MILES

C_t = SNYDER'S BASIN COEFFICIENT = 2.0 ASSUMED AVERAGE

C_p = SNYDER'S PEAKING COEFFICIENT = .66 (FROM REF. 20)

t_p = STANDARD LAG IN HOURS = $C_t(LL_{CA})^{0.3}$ = 2.33 HOURS

Req'd unit rainfall duration = t_r

∴ USE t_p = 2.3 HOURS $t_r = \frac{t_p}{5.5} = \frac{2.3}{5.5} = 0.42$ hr. $\doteq$ 25 min.

use t_r' = 10 min < 25 max. OK

SUBAREA 2: TROY RESERVOIR SURFACE, AREA = .081 SQ. MI. = 52.1 ACRES

LOSS RATES: NONE BECAUSE RAINFALL ≈ RUNOFF FOR WATER SURFACE

UNIT HYDROGRAPH PARAMETERS:

FOR U.H. w/ 10 MINUTE DURATION & 1" RAIN

$$\bar{Q} = \frac{A(1")}{t} = \frac{52.1\text{ acres}(1")}{10\text{ minutes}}\left(\frac{43{,}560\text{ SQ. FT.}}{1\text{ acre}}\right)\left(\frac{1\text{ FT}}{12\text{ INCHES}}\right)\left(\frac{1\text{ MINUTE}}{60\text{ SECONDS}}\right)$$

$\bar{Q}$ = 315 cfs (W/O LOSS RATE)

Form CTM-405

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JOB: WRIGHT LAKE DAM
SHEET NO. ____ OF R 8/10/81
CALCULATED BY: CLV DATE: 5/20/81
CHECKED BY: JPB DATE: 7/13/81
SCALE: 58.01.00012

DRAINAGE AREA DATA FOR HEC-1 DB MODEL

SUBAREA 3: AREA ABOVE BRADLEY LAKE, AREA = 1.103 SQ. MI.

LOSS RATES: 1.0" INITIALLY, 0.1"/HOUR - CONSTANT LOSS RATE

UNIT HYDROGRAPH PARAMETERS: USE SNYDER METHOD

A = DRAINAGE AREA = 1.103 SQ. MILES
L = LENGTH OF MAIN WATERCOURSE TO UPSTREAM LIMIT OF DRAINAGE AREA = 1.89 MILES
L_{CA} = LENGTH OF MAIN WATERCOURSE TO POINT OPPOSITE THE CENTROID OF THE DRAINAGE AREA = .87 MILES
C_t = SNYDER'S BASIN COEFFICIENT = 2.0 ASSUMED AVERAGE
C_p = SNYDER'S PEAKING COEFFICIENT = .66 (FROM REF. 20)
t_p = STANDARD LAG IN HOURS = $C_t(LL_{CA})^{0.3}$ = 2.32 HOURS

Req'd unit rainfall duration = t_r

∴ USE t_p = 2.3 HOURS $t_r = \frac{t_p}{5.5} = \frac{2.3}{5.5} = 0.42$ hr. $\doteq$ 25 min.

use t_r' = 10 min. < 25 max ok

SUBAREA 4: BRADLEY LAKE SURFACE, AREA = .013 SQ. MI. = 8.3 ACRES

LOSS RATES: NONE BECAUSE RAINFALL ≅ RUNOFF FOR WATER SURFACE

UNIT HYDROGRAPH PARAMETERS:

FOR U.H. W/ 10 MINUTE DURATION + 1" RAIN

$$\overline{Q} = \frac{A(1")}{t} = \frac{8.3 \text{ acres } (1")}{10 \text{ minutes}} \left(\frac{43{,}560 \text{ SQ. FT.}}{1 \text{ acre}}\right)\left(\frac{1 \text{ FT}}{12 \text{ INCHES}}\right)\left(\frac{1 \text{ minute}}{60 \text{ seconds}}\right)$$

$\overline{Q}$ = .50 cfs (w/o LOSS RATE)

Form CTM-405

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JOB WRIGHT LAKE DAM

SHEET NO. OF R 8/10/81

CALCULATED BY ELV DATE 5/20/81

CHECKED BY [illegible] DATE 7/21/81

SCALE 58.01.00012

DRAINAGE AREA DATA FOR HEC-1 DB MODEL

SUBAREA 5: AREA ABOVE WRIGHT LAKE, AREA = 0.097 SQ. MI.

LOSS RATES: 1.0" INITIALLY, 0.1"/HOUR - CONSTANT LOSS RATE

UNIT HYDROGRAPH PARAMETERS: USE SNYDER METHOD

A = DRAINAGE AREA = 0.097 SQ. MILES

L = LENGTH OF MAIN WATERCOURSE TO UPSTREAM LIMIT OF DRAINAGE AREA = .49 MILES

L_{CA} = LENGTH OF MAIN WATERCOURSE TO POINT OPPOSITE THE CENTROID OF THE DRAINAGE AREA = .36 MILES

C_t = SNYDER'S BASIN COEFFICIENT = 2.0 ASSUMED AVERAGE

C_p = SNYDER'S PEAKING COEFFICIENT = .66 (FROM REF. 20)

t_p = STANDARD LAG IN HOURS = $C_t(L L_{CA})^{0.3}$ = 1.19 HOURS

Req'd unit rainfall duration = t_r

∴ USE t_p = 1.2 HOURS $t_r = \frac{t_p}{5.5} = \frac{1.2}{5.5} = 0.22$ hrs. ≅ 13 min.

use t_r' = 10 min < 13 max. ok

SUBAREA 6: WRIGHT LAKE SURFACE, AREA = .012 SQ. MI. = 7.6 ACRES

LOSS RATES: NONE BECAUSE RAINFALL ≃ RUNOFF FOR WATER SURFACE

UNIT HYDROGRAPH PARAMETERS:

FOR U.H. W/ 10 MINUTE DURATION & 1" RAIN

$$\bar{Q} = \frac{A(1")}{t} = \frac{7.6 \text{ acres } (1")}{10 \text{ minutes}} \left(\frac{43,560 \text{ SQ FT}}{1 \text{ acre}}\right)\left(\frac{1 \text{ FT}}{12 \text{ INCHES}}\right)\left(\frac{1 \text{ minutes}}{60 \text{ seconds}}\right)$$

$\bar{Q}$ = 46 cfs (w/o LOSS RATES)

Form CTM-405

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PROFESSIONAL ENGINEERS LAND SURVEYORS LAND PLANNING CONSULTANTS
COMPUTER SERVICES LANDSCAPE ARCHITECTURE LABORATORY SERVICES

JOB WRIGHT LAKE DAM
SHEET NO. ______ OF ______
CALCULATED BY CLV DATE 5/14/81
CHECKED BY [illegible] DATE 7/13/81
SCALE 58.01.00012

ELEVATION - AREA - STORAGE COMPUTATIONS

TROY RESERVOIR(1) VOLUME: COMPUTED BY METHOD OF CONIC SECTIONS $\Delta V_{12} = h/3 (A_1 + A_2 + \sqrt{A_1 A_2})$

	ELEVATION (NGVD - ft.)	AREA(2) (acres)	INPUT VOLUME (acre-feet)
SPILLWAY CREST	472 (3)	52.1	1,227 (3)
TOP OF DAM	476.5 (3)	62.3 EST.	1,502 (CALC. BY HEC-1DB PROGRAM)
	480	70.3	1,715
	490	93.0	2,529

(1) ACCORDING TO NYSDEC FILES TROY RESERVOIR IS ACTUALLY 2 IMPOUNDMENTS, VANDERHEYDEN RESERVOIR (LOWER DAM IS NY00116) AND BRUNSWICK RESERVOIR (UPPER DAM IS NY00114). THE UPSTREAM DAM (NY00114) IS JUST A 12' HIGH BERM WITH 2 LARGE UNCONTROLLED CULVERTS THROUGH IT. THE NATURE OF THE UPSTREAM RESERVOIR DAM IS SUCH THAT BOTH RESERVOIR LEVELS STAY THE SAME. THEREFORE FOR MODELING PURPOSES THE TROY RESERVOIR WAS CONSIDERED TO BE ONE RESERVOIR WITH A UNIFORMLY VARYING STAGE.

(2) FROM USGS TOPOGRAPHIC MAPPING.

(3) FROM PLANS & DATA IN NYSDEC FILES

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JOB WRIGHT LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY CLV DATE 5/14/81
CHECKED BY JPA DATE 7/13/81
SCALE 5B.01.00012

DISCHARGE COMPUTATIONS - TROY RESERVOIR

DAM APPURTENANCES	ELEVATION (NGVD)	SIZE
CHUTE SPILLWAY	CREST EL = 472 (1)	17' CREST LENGTH (1)
DAM	TOP OF DAM = 476.5 (1)	363' CREST LENGTH (1) (EXCLUDING SPILLWAY)

OUTLET WORKS - NOT MODELED, ASSUMED CLOSED.

FOR FLOW OVER SPILLWAY + DAM: $Q = 3.087 LH^{1.5}$ (FORMULA FOR CRITICAL FLOW OVER BROAD-CRESTED WEIR, REF. 9)
INPUT
(neglect abutment contractions & variations of coeff.)

	ELEVATION (NGVD)	$H_{SPILLWAY}$ (ft.)	H_{DAM} (ft.)	$Q_{SPILLWAY}$ (cfs)	Q_{DAM} (cfs)	Q_{TOTAL} (cfs)
SPILLWAY CREST	472	0	0	0	0	0
	473	1	0	52	0	52
	474	2	0	148	0	148
	475	3	0	273	0	273
	476	4	0	420	0	420
TOP OF DAM	476.5	4.5	0	501	0	501
	477	5	0.5	587	396	983
	478	6	1.5	771	2,059	2,830
	479	7	2.5	972	4,429	5,401
	480	8	3.5	1,187	7,337	8,524

(1) FROM PLANS & DATA IN NYSDEC FILES

Form CTM-405

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JOB WRIGHT LAKE DAM
SHEET NO. OF
CALCULATED BY CJV DATE 5/19/81
CHECKED BY JMB DATE 7/13/81
SCALE 58.01.00012

ELEVATION - AREA - STORAGE COMPUTATIONS

BRADLEY LAKE

RESERVOIR VOLUME: COMPUTED BY PROGRAM USING METHOD OF CONIC SECTIONS $\Delta V_{12} = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$
By HEC-1 DB Program

	ELEVATION (1) (NGVD - ft.)	INPUT AREA (2) (acres)	VOLUME (acre - feet)
	247.2	.02	0
	251.2	.21	0
	255.2	1.22	3
	259.2	2.46	10
	263.2	3.29	22
	267.2	4.03	36
	271.2	4.83	54
	275.2	5.62	75
	279.2	6.40	99
	283.2	7.17	126
SERVICE SPILLWAY CREST →	288	8.30	163
AUXILIARY SPILLWAY CREST →	290.3 (4)	9.8 EST.	186 EST.
TOP OF DAM →	293.3 (4)	11.7 EST.	215
	300	16.0 (3)	306

(1) NGVD IS 1.2' HIGHER THAN ELEVATION BASE OF JUNE 1894 CONTOUR MAPPING, APPENDIX G-1, BASED ON USGS MAPPING.

(2) FROM CONTOUR MAPPING, APPENDIX G-1 , EXCEPT WHERE NOTED.

(3) FROM USGS CONTOUR MAPPING.

(4) FIELD MEASUREMENT

Form CTM-405

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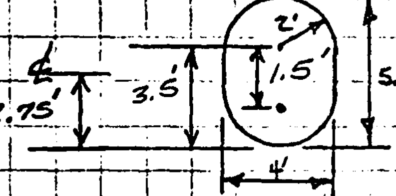
3000 TROY ROAD, SCHENECTADY, N.Y. 12309
(518) 785-0976

JOB: WRIGHT LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY: CLV DATE: 5/19/81
CHECKED BY: JPR DATE: 7/13/81
SCALE: 58.01.00012

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM

SERVICE SPILLWAY (CULVERT SPILLWAY)



FOR SPILLWAY FLOWING PARTIALLY FULL:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$ (MANNING FORMULA)

OR

APPROX. (liberal) $Q = \left(\frac{A^3 g}{T}\right)^{1/2}$ (FORMULA FOR CRITICAL FLOW THROUGH ANY SECTION; REF. 8)

S = SLOPE ≈ .05 est.
n = .016 (BRICK PIPE)
A = AREA
$R = \frac{A}{P}$ = HYDRAULIC RADIUS
P = WETTED PERIMETER
T = W.S. TOP WIDTH

FOR SPILLWAY FLOWING FULL:
(INLET CONTROL)

$$Q = .6A\sqrt{2gh}$$ (FORMULA FOR ORIFICE FLOW, REF. 9 for free discharge) h measured to ℄

ELEVATION (NGVD)	HEIGHT ABOVE INVERT (ft)	T (ft)	A (ft²)	R (ft)	$Q_{MANNING}$ (cfs)	$Q_{CRITICAL}$ PARTIALLY FULL (cfs)	h (ft)	$Q_{ORIFICE}$ (cfs)		$Q_{SERVICE\ SPILLWAY}$ (cfs)
287.5 (1)	0	0	—	—	0	0				0
SERVICE SPILL CREST 288 (2)	.5	2.7	0.91	0.31	9	3				≅ 0 ±
289.5	2	4	6.28	1	131	45				45
291	3.5	4	12.28	1.32	308	122	0.75	51	USE	122
293	5.5		18.57	1.19	434		2.75	148		148
TOP OF DAM 293.3	5.8		"	"			3.05	156		156
294	6.5		"	"			3.75	173		173
295	7.5		"	"			4.75	195		195
296	8.5		"	"			5.75	214		214
297	9.5		"	"			6.75	232		232
298	10.5		"	"			7.75	249		249
299	11.5		18.57	1.19			8.75	264		264

(1) INLET INVERT OF CULVERT SPILLWAY PIPE.
(2) SILL ELEVATION OF INLET U/S OF CULVERT SPILLWAY PIPE INVERT. NO FLOW IN SPILLWAY BELOW THIS ELEVATION.

Form CTM-405 A

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COMPUTER SERVICES LANDSCAPE ARCHITECTURE LABORATORY SERVICES

JOB: WRIGHT LAKE DAM

SHEET NO. ____ OF ____

CALCULATED BY: ELV DATE: 5/19/81

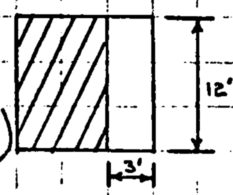
CHECKED BY: JMB DATE: 7/13/81

SCALE: 5B.01.00012

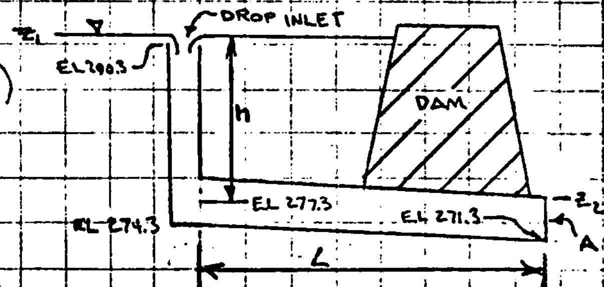
DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM

AUXILIARY SPILLWAY (DROP INLET)

PLAN OF DROP INLET



CONSISTS OF: 2 - 12' WEIRS + 2 - 3' WEIR FOR A TOTAL WEIR LENGTH OF 30' + HAS A 6' DIA OUTLET PIPE ± (Field Measure.)



FOR FLOW WHEN WEIR FLOW CONTROLS:

$$Q = 3.33\,LH^{1.5}$$ (FORMULA FOR CRITICAL FLOW OVER SHARP-CRESTED WEIR, REF. 9)

FOR FLOW WHEN SPILLWAY OUTLET PIPE CONTROLS (INLET CONTROL):

$$Q = .6\,A\sqrt{2gh}$$ (FORMULA FOR ORIFICE FLOW (INLET CONTROL), REF. 9, FREE DISCHARGE)

S = slope $\doteq$ 0.02 est.

FOR FLOW WHEN SPILLWAY OUTLET CONDUIT CONTROLS (OUTLET CONTROL):

L = 150' (ESTIMATE)

n = .016 (BRICK PIPE)

D = 6' DIA.

k_{en} = 0.5

$$h_f = \frac{Q^2 n^2 L}{2.21 A^2 R^{4/3}}$$ (MANNINGS EQUATION)

$$h_{entrance} = k_{en}\frac{V^2}{2g}$$ (Bernoulli Eq.)

$$A = \frac{\pi D^2}{4} = 28.27^{\square}$$

$$\cancel{\frac{P}{\gamma}}^{0} + \cancel{\frac{V^2}{2g}}^{0} + z_1 = \cancel{\frac{P}{\gamma}}^{\sim 0} + \frac{V_2^2}{2g} + z_2 + h_{en} + h_f$$

$$R = \frac{A}{P} = \frac{D}{4} = \frac{6}{4} = 1.5'$$

$V = Q/A$

$$Q = \left(\frac{z_1 - z_2}{\frac{k_{en}+1}{2gA^2} + \frac{n^2 L}{2.21 A^2 R^{4/3}}}\right)^{1/2}$$

$$Q = \left(\frac{z_1 - 277.3}{4.181\times10^{-5}}\right)^{1/2}$$

FOR THIS PARTICULAR DROP INLET THE ¢ OF THE INLET END OF THE OUTLET PIPE + Z_2 ARE AT THE SAME ELEVATION, EL 277.3 OR $h = z_1 - z_2$

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JOB WRIGHT LAKE DAM

SHEET NO. ________ OF ________

CALCULATED BY CLV DATE 5/19/81

CHECKED BY QMB DATE 7/13/81

SCALE 58.01.00012

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM

AUXILIARY SPILLWAY (DROP INLET)

	WATER SURFACE ELEVATION (NGVD)	H (ft)	h ($z_1 - z_2$) (ft)	Q_{WEIR} (cfs)	Q_{PIPE} (INLET CONTROL) (cfs)	Q_{PIPE} (OUTLET CONTROL) (cfs)		$Q_{AUXILIARY\ SPILLWAY}$ (cfs)
SER. SPILL.	288	—	—	0				0
AUX. SPILL.	290.3	0	13	0				0
	291	.7	13.7	59	504	572		59
	292	1.7	14.7	221	522	593		221
	293	2.7	15.7	443	539	613		443
TOP OF DAM	293.3	3	16	519	544	619	(SAY 520)	519
	294	3.7	16.7	711	556	632		556
	295	4.7	17.7		573	650		573
	296	5.7	18.7		589	669		589
	297	6.7	19.7		604	686		604
	298	7.7	20.7		619	704		619
	299	8.7	21.7		634	720		634

Form CTM-405 A

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JOB WRIGHT LAKE DAM

SHEET NO. ____ OF ____

CALCULATED BY CLV DATE 5/19/81

CHECKED BY JAB DATE 7/13/81

SCALE 58.01.00012

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM SUMMARY

DAM APPURTENANCE	ELEVATION (NGVD)	SIZE
SERVICE SPILLWAY (CULVERT SPILLWAY)	CREST EL = 288	4' x 5.5' OVAL
AUXILIARY SPILLWAY (DROP INLET)	CREST EL = 290.3	30' TOTAL WEIR LENGTH
DAM	TOP OF DAM EL = 293.3	530' CREST LENGTH
LOW LEVEL DRAIN	INVERT EL 247 ± estimated (2-12" pipes & 1-8" pipe, total Area = 1.9 ft²)	

FOR FLOW OVER DAM: $Q_{DAM} = 3.087\,LH^{1.5}$ (FORMULA FOR CRITICAL FLOW OVER A BROAD-CRESTED WEIR, REF. 9)
(INPUT TO PROGRAM)

	ELEVATION (NGVD)	$H_{SERVICE\ SPILLWAY}$ (ft)	$H_{AUXILIARY\ SPILLWAY}$ (ft)	H_{DAM} (ft)	$Q_{SERVICE\ SPILLWAY}$ (cfs)	$Q_{AUXILIARY\ SPILLWAY}$ (cfs)	INPUT $Q_{SPILL\ COMB.}$ (cfs)	Q_{DAM} (cfs)
SERVICE SPILLWAY CREST →	288	0	0	0	0	0	0	0
	289.5	1.5	0	0	45	0	45	0
AUXILIARY SPILLWAY CREST →	290.3	2.3	0	0	86 EST.	0	86	0
	291	3	.7	0	122	59	181	0
	292	4	1.7	0	135 EST.	221	356	0
	293	5	2.7	0	148	443	591	0
TOP OF DAM →	293.3	5.3	3	0	156 (160)	519 (520)	675 SAY (680)	0
	294	6	3.7	.7	173	556	729	958
	295	7	4.7	1.7	195	573	768	3,626
	296	8	5.7	2.7	214	589	803	7,259
	297	9	6.7	3.7	232	604	836	11,644
	298	10	7.7	4.7	249	619	868	16,671
	299	11	8.7	5.7	264	634	898	22,265

Form CTM-405A

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JOB WRIGHT LAKE DAM

SHEET NO. ____ OF ____

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CHECKED BY QAB DATE 7/13/81

SCALE 58.01.00012

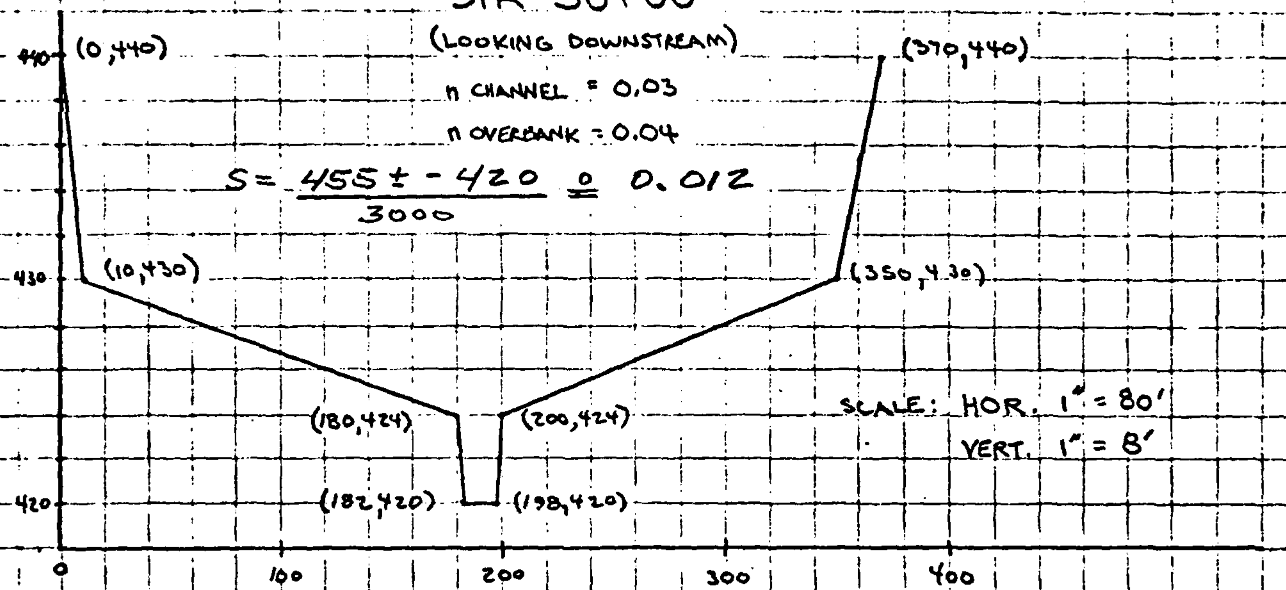
STA 30+00

(LOOKING DOWNSTREAM)

n CHANNEL = 0.03

n OVERBANK = 0.04

$$S = \frac{455\pm - 420}{3000} \doteq 0.012$$



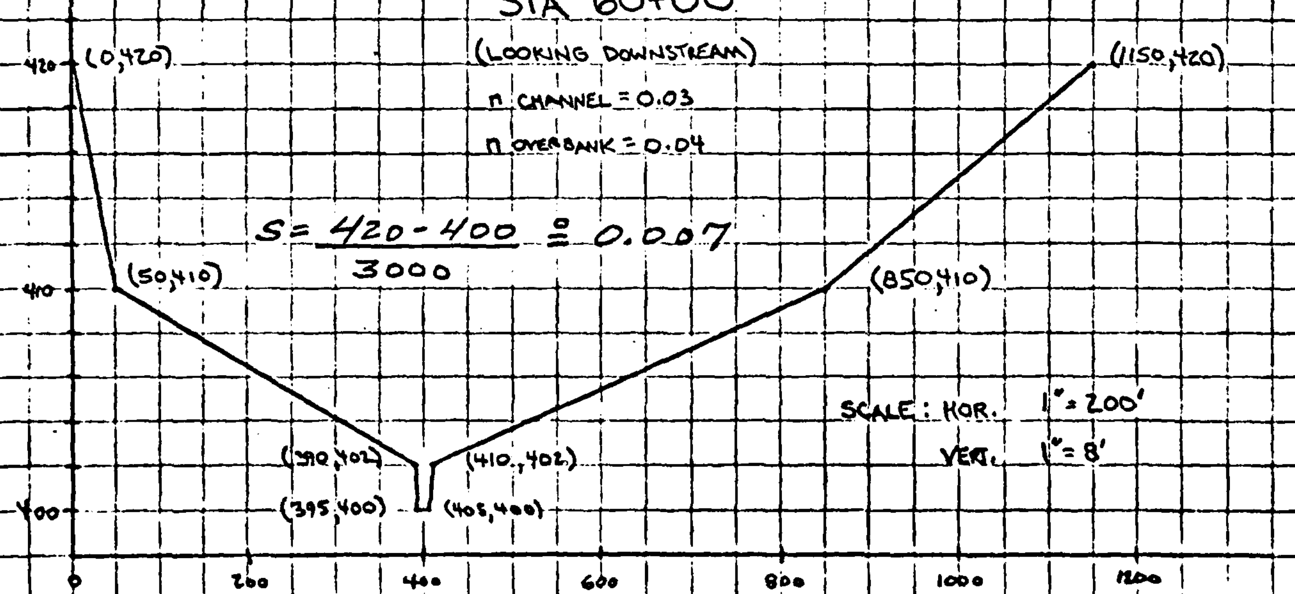
STA 60+00

(LOOKING DOWNSTREAM)

n CHANNEL = 0.03

n OVERBANK = 0.04

$$S = \frac{420 - 400}{3000} \doteq 0.007$$



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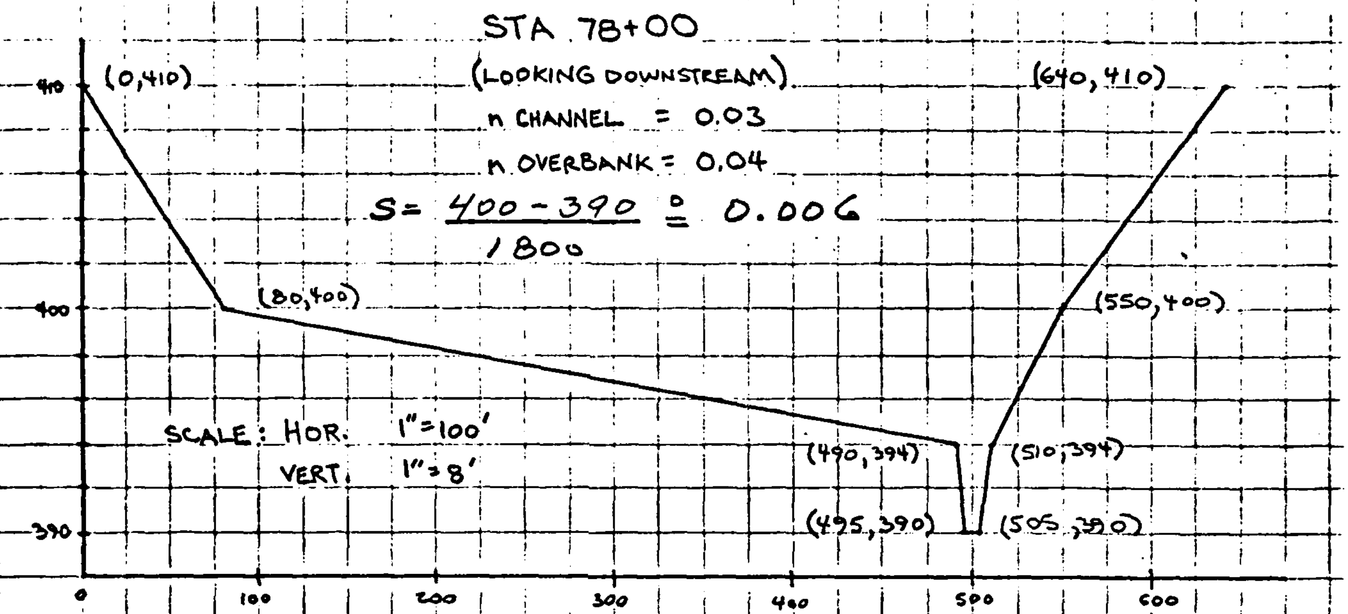
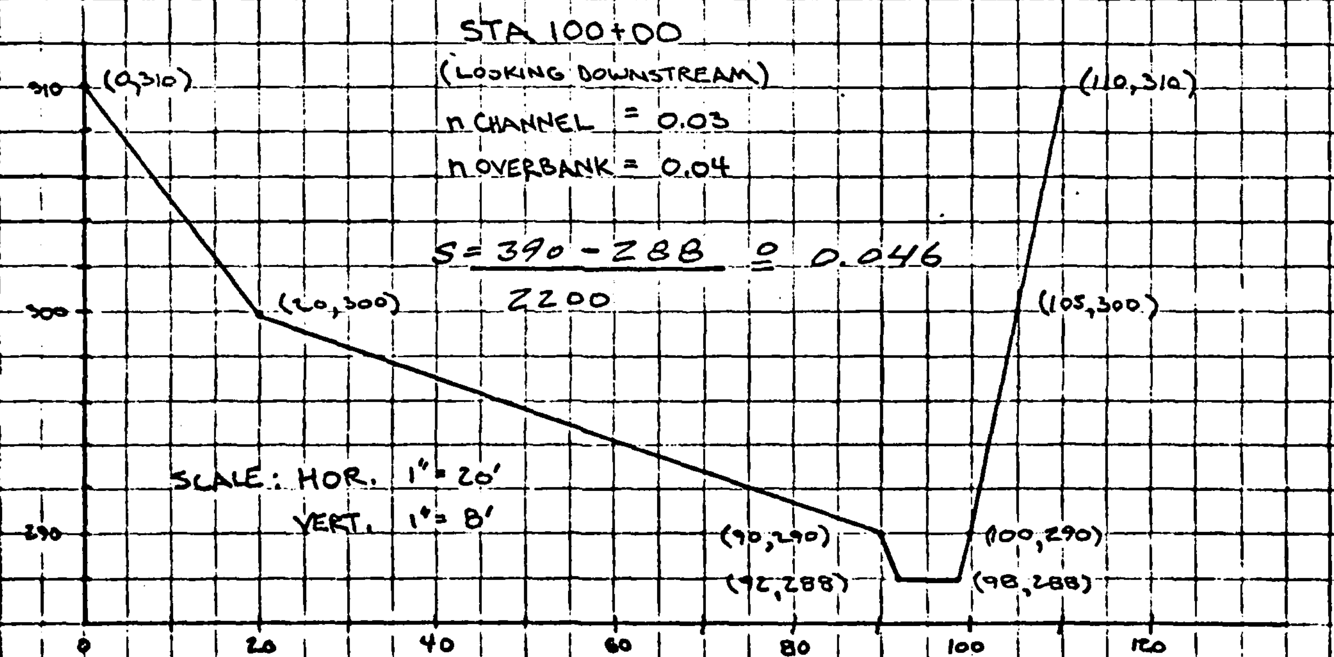
SHEET NO. ______ OF ______
CALCULATED BY ELV DATE 5/20/81
CHECKED BY JPQ DATE 7/13/81
SCALE 58.01.00012





F — CTA. 105 A

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JOB WRIGHT LAKE DAM
SHEET NO. ______ OF ______
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CHECKED BY [illegible] DATE 7/21/81
SCALE 58.01.00012

ELEVATION - AREA - STORAGE COMPUTATIONS

WRIGHT LAKE

RESERVOIR VOLUME: COMPUTED BY PROGRAM USING METHOD OF CONIC SECTIONS $V_{12} = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$

	ELEVATION (1) (NGVD - ft.)	INPUT AREA (2) (acres)	VOLUME (acre-feet) (By HEC-1 DB Program)
	209.4	.04	0
	213.4	.52	1
	217.4	1.70	5
	221.4	3.09	15
	225.4	4.09	29
	229.4	5.58	48
	233.4	6.53	72
SPILLWAY CREST →	238 (4)	7.58	105
TOP OF DAM →	241 (4)	8.7 EST.	129
	250	12.2 (3)	222

(1) NGVD IS 0.6′ LOWER THAN ELEVATION BASE OF JUNE 1894 CONTOUR MAPPING, APPENDIX G-1, BASED ON USGS MAPPING.

(2) FROM CONTOUR MAPPING, APPENDIX G-1 , EXCEPT WHERE NOTED.

(3) FROM USGS CONTOUR MAPPING.

(4) FIELD MEASUREMENT. TOP OF DAM (ROAD CURB) SLOPES UNIFORMLY FROM ABOUT EL 244.7 ON LEFT TO EL 240.8 ON RIGHT.

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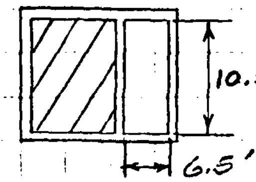
CHECKED BY JMB DATE 7/21/81
SCALE 58.01.00012

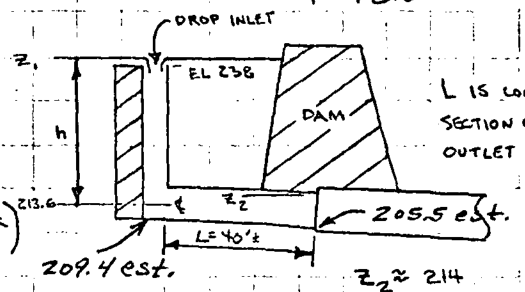
DISCHARGE COMPUTATIONS - WRIGHT LAKE DAM

SPILLWAY (DROP INLET)

PLAN OF DROP INLET



CONSISTS OF : 2 - 10.5' WEIRS + 2 - 6.5' WEIRS
FOR A TOTAL WEIR LENGTH OF 34'.
OUTLET PIPE IS 170'± LONG w/
CONTROL SECTION NEAR INLET, A
40' OVAL PIPE 4.5' x 8.5'



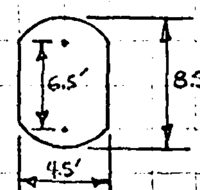
L IS CONTROL SECTION OF OUTLET PIPE

FOR FLOW WHEN WEIR FLOW CONTROLS:

$$Q = 3.33 L H^{1.5}$$ (FORMULA FOR CRITICAL FLOW OVER SHARP-CRESTED WEIR REF. 9)

FOR FLOW WHEN SPILLWAY OUTLET PIPE CONTROLS (INLET CONTROL):

OUTLET PIPE CONTROL SECTION



$$Q = .6 A\sqrt{2gh}$$ (FORMULA FOR ORIFICE FLOW [INLET CONTROL], REF. 9) free discharge

FOR FLOW WHEN SPILLWAY OUTLET PIPE CONTROLS (OUTLET CONTROL):

$$h_f = \frac{Q^2 n^2 L}{2.21 A^2 R^{4/3}}$$ (Manning's Equation)

$$h_{entrance} = k_{en} \frac{V^2}{2g}$$ (Bernoulli Equation)

$$\cancel{\frac{P_1}{\gamma}}^{0} + \cancel{\frac{V_1^2}{2g}}^{\approx 0} + Z_1 = \cancel{\frac{P_2}{\gamma}}^{\approx 0} + \frac{V_2^2}{2g} + Z_2 + h_{ex} + h_f$$

$$Q = \left(\frac{Z_1 - Z_2}{\frac{k_{en}+1}{2gA^2} + \frac{n^2 L}{2.21 A^2 R^{4/3}}} \right)^{1/2}$$

$$Q = \left(\frac{Z_1 - 214}{2.302 \times 10^{-5}} \right)^{1/2}$$

S = 10%± est.
L ≈ 40±' (LENGTH OF CONTROL SECTION)
n = .016 (CONTROL SECTION IS BRICK)
$k_{en} = 0.5$

A = AREA OF CONTROL SECTION
A ≈ 7.5' x 4.5' = 33.75 ft²

P = WETTED PERIMETER OF CONTROL SECTION
P ≈ 2x6.5' + 2x5.5' = 24'

$R = \frac{A}{P} = \frac{33.75}{24} = 1.41'$ Full
V = Q/A

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(518) 785-0976

JOB WRIGHT LAKE DAM

SHEET NO. ____ OF ____

CALCULATED BY ELV DATE 5/19/81

CHECKED BY JMB DATE 7/21/81

SCALE 58.01.00012

DISCHARGE COMPUTATIONS - WRIGHT LAKE DAM

SPILLWAY (DROP INLET)

	WATER SURFACE ELEVATION (NGVD)	H (ft.)	h (ft.)	$Z_1 - Z_2$ (ft.)	Q_{WEIR} (cfs)	Q_{PIPE} (INLET CONTROL) (cfs)	Q_{PIPE} (OUTLET CONTROL) (cfs)	$Q_{SPILLWAY}$ (cfs)
SPILLWAY CREST	238	0	24.4	24	0	0	0	0
	239	1	25.4	25	113	819	1,042	113
	240	2	26.4	26	320	835	1,063	320
TOP OF DAM	241	3	27.4	27	588	851	1,083	588 SAY 590
	242	4	28.4	28	906	866	1,103	866
	243	5	29.4	29	1,266	881	1,122	881
	244	6	30.4	30	1,664	896	1,142	896
	245	7	31.4	31	2,097	911	1,160	911
	246	8	32.4	32		925	1,179	925
	247	9	33.4	33		939	1,197	939
	248	10	34.4	34		953	1,215	953
	249	11	35.4	35		967	1,233	967
	250	12	36.4	36		980	1,251	980

C. T. MALE ASSOCIATES, P. C.
ENGINEERS SURVEYORS ARCHITECTS
LANDSCAPE ARCHITECTS PLANNERS
3000 TROY ROAD, SCHENECTADY, N.Y. 12309
(518) 785-0976

JOB WRIGHT LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/20/81
CHECKED BY [illegible] DATE 7/21/81
SCALE 58.01.00012

DISCHARGE COMPUTATIONS - WRIGHT LAKE DAM SUMMARY

DAM APPURTENANCE	ELEVATION (NGVD)	SIZE
SPILLWAY (DROP INLET)	CREST EL = 238	34' TOTAL WEIR LENGTH
DAM	TOP OF DAM EL = 241	350' CREST LENGTH

REGULATING OUTLETS - NONE OPERABLE. LOW LEVEL OUTLET INV. EL 210 ± est. No elev. DATA ON OTHER OUTLETS.
(4, EACH THOUGHT TO BE 2'x 2 1/2')

FOR FLOW OVER DAM: $Q_{DAM} = 3.087LH^{1.5}$ (FORMULA FOR CRITICAL FLOW OVER A BROAD-CRESTED WEIR, REF. 9)

Input

	ELEVATION (NGVD)	$H_{SPILLWAY}$ (ft.)	H_{DAM} (ft.)	INPUT $Q_{SPILLWAY}$ (cfs)	Q_{DAM} (cfs)	Q_{TOTAL} (cfs)
SPILLWAY CREST	238	0	0	0	0	0
	239	1	0	113	0	113
	240	2	0	320	0	320
TOP OF DAM	241	3	0	588	0	588 SAY 590
	242	4	1	866	1,080	1,946
	243	5	2	881	3,056	3,937
	244	6	3	896	5,614	6,510
	245	7	4	911	8,644	9,555
	246	8	5	925	12,080	13,005
	247	9	6	939	15,879	16,818
	248	10	7	953	20,010	20,963
	249	11	8	967	24,447	25,414
	250	12	9	980	29,172	30,152

F - CT'' '05/

```
A NYD DAM INSPECTION: DACW51-81-C-0014
A NY00757, WRIGHT LAKE DAM, 60.00852
A OVERTOPPING ANALYSIS  WLD1
B    288       0      10                                                     4
B1     5
J      1       2       1
J1   1.0     0.5
K      0    SA-1                                           1
K1 SUBAREA 1 RUNOFF COMPUTATION
M      1       1   1.501              10                                     1
P           19.5     111     123     132     142
T                                                        1.0     .10
W    2.3     .66
X     -2               1
K      0    SA-2                                           1
K1 SUBAREA 2 (TROY RESERVOIR) RUNOFF COMPUTATION
M      1      -1   0.081              10                                     1
P           19.5     111     123     132     142
T                                                          0       0
U      1
U1   315
X     -2               1
K      2   SA-2C                                           1
K1 COMBINING HYDROGRAPHS 1 & 2
K      1     RES                                           1
K1 ROUTING FLOW THROUGH TROY RESERVOIR
Y                              1       1
Y1     1                                                -472       0
SS  1227    1715    2529
SE   472     480     490
S*   472      17   3.087     1.5
SD 476.5   3.087     1.5     363
K      1   30+00                               5           1
K1 CHANNEL ROUTING STA 30+00
Y                              1       1
Y1     1                                                  -1
Y6   .04     .03     .04     420     440    3000        .012
Y7     0     440      10     430     160     424         182     420     138     420
Y7   200     424     350     430     370     440
K      1   60+00                               5           1
K1 CHANNEL ROUTING STA 60+00
Y                              1       1
Y1     1                                                  -1
Y6   .04     .03     .04     400     420    3000        .007
Y7     0     420      50     410     390     402         395     400     405     400
Y7   410     402     650     410    1150     420
K      1   78+00                               5           1
K1 CHANNEL ROUTING STA 78+00
Y                              1       1
Y1     1                                                  -1
Y6   .04     .03     .04     390     410    1800        .006
Y7     0     410      80     400     490     394         495     390     305     390
Y7   510     394     550     400     640     410
K      1  100+00                               5           1
K1 CHANNEL ROUTING STA 100+00
Y                              1       1
Y1     1                                                  -1
Y6   .04     .03     .04     288     310    2200        .046
Y7     0     310      20     300      90     290          92     268      98     288
Y7   100     290     105     300     110     310
```

```
K       0     SA-3                                                1
KI SUBAREA 3 RUNOFF COMPUTATION
M       1       1   1.103              10                                   1
P             19.5    111      123    132      142
T                                                              1.0     .10
W     2.3      .66
X      -2              1
K       0     SA-4                                                1
KI SUBAREA 4 (BRADLEY LAKE) RUNOFF COMPUTATION
M       1      -1    .013              10                                   1
P             19.5    111      123    132      142
T                                                               0       0
U       1
UI     50
X      -2              1
K       3    SA-4C                                                1
KI COMBINING HYDROGRAPHS 2C+3&4
K       1      RES                                                1
KI ROUTING FLOW THROUGH BRADLEY LAKE
Y                               1        1
Y1      1                                                    -288      -1
Y4    289    289.5   290.3     291      292      293    293.3     294     295     296
Y4    297      298     299
Y5      0       45      86     181      356      591      675     729     768     803
Y5    836      868     898
$E    .02      .21    1.22    2.46     3.29     4.03     4.83    5.62    6.40    7.17
$A   9.30     16.0
$E  247.2    251.2   255.2   259.2    263.2    267.2    271.2   275.2   279.2   283.2
$E    288      300
$*    288
$D  293.3    3.087     1.5     530
K       0     SA-5                                                1
KI SUBAREA 5 RUNOFF COMPUTATION
M       1       1    .097              10                                   1
P             19.5    111      123    132      142
T                                                              1.0     .10
W     1.2      .66
X      -2              1
K       0     SA-6                                                1
KI SUBAREA 6 (WRIGHT LAKE) RUNOFF COMPUTATION
M       1      -1    .012              10                                   1
P             19.5    111      123    132      142
T                                                               0       0
U       1
UI     46
X      -2              1
K       3    SA-6C                                                1
KI COMBINING HYDROGRAPHS 4C+5&6
K       1      RES                      2                         1
KI ROUTING FLOWS THROUGH WRIGHT LAKE
Y                               1        1
Y1      1                                                    -238      -1
Y4    238      239     240     241      242      243      244     245     246     247
Y4    248      249     250
Y5      0      113     320     588      866      881      896     911     925     939
Y5    953      967     980
$E    .04      .52    1.70    3.09     4.09     5.58     6.53    7.56    12.2
$E  209.4    213.4   217.4   221.4    225.4    229.4    233.4     238     250
$*    238
$D    241    3.087     1.5     350
```

```
*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION       JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************

RUN  DATE: 8/07/81
     TIME: 1:51 PM

                    NYD DAM INSPECTION: DACW51-81-C-0014
                    NY00757, WRIGHT LAKE DAM, 80.03852
                    OVERTOPPING ANALYSIS  WL01

                                     JOB SPECIFICATION
                    NQ       NHR     NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
                   268         0       10       0       0       0       0       0       4       0
                                            JOPER     NWT   LROPT   TRACE
                                                5       0       0       0

                                   MULTI-PLAN ANALYSES TO BE PERFORMED
                                         NPLAN= 1 NRTIO= 2 LRTIO= 1
                      RTIOS=    1.00    0.50

            **********      **********      **********      **********      **********

                                        SUB-AREA RUNOFF COMPUTATION

                   SUBAREA 1 RUNOFF COMPUTATION
                                   ISTAG   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                    SA-1       0       0       0       0       0       1       0       0

                                             HYDROGRAPH DATA
                    IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                        1       1    1.50    0.00   10.00    0.00   0.000       0       1       0

                                               PRECIP DATA
                                 SPFE     PMS      R6     R12     R24     R48     R72     R96
                                 0.00   19.50  111.00  123.00  132.00  142.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                                LOSS DATA
                 LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                     0    0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.00

                                           UNIT HYDROGRAPH DATA
                                        TP=  2.30     CP=0.66     NTA=  0

                                             RECESSION DATA
                                STRTQ=   -2.00    QRCSN=    0.00    RTIOR= 1.00

                  UNIT HYDROGRAPH 70 END-OF-PERIOD ORDINATES, LAG=   2.28 HOURS, CP= 0.65  VOL= 1.00
                  6.       21.       43.       68.       96.      126.      157.      188.      218.      242.
                261.      275.      283.      286.      282.      268.      247.      227.      208.      191.
                175.      160.      147.      135.      124.      114.      104.       96.       88.       81.
                 74.       68.       62.       57.       52.       48.       44.       40.       37.       34.
                 31.       29.       26.       24.       22.       20.       19.       17.       16.       14.
                 13.       12.       11.       10.        9.        9.        8.        7.        7.        6.
                  6.        5.        5.        4.        4.        4.        3.        3.        3.        3.

                                              END-OF-PERIOD FLOW
          MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q        MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q
```

```
                                                                     SUM  22.15  18.49   3.66  104956.
                                                                        ( 563.)( 470.)(  93.)( 2972.02)

          **********     **********     **********     **********     **********

                               SUB-AREA RUNOFF COMPUTATION

      SUBAREA 2 (TROY RESERVOIR) RUNOFF COMPUTATION
                      ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                      SA-2        0       0       0       0       0       1       0       0

                                   HYDROGRAPH DATA
       IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
           1      -1    0.08    0.00   10.00    0.00   0.000       0       1       0

                                     PRECIP DATA
                SPFE     PMS      R6     R12     R24     R48     R72     R96
                0.00   19.50  111.00  123.00  132.00  142.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                      LOSS DATA
   LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
       0    0.00    0.00    1.00    0.00    0.00    1.00    0.00    0.00    0.00    0.00

                                    RECESSION DATA
                       STRTQ=   -2.00      QRCSN=    0.00      RTIOR= 1.00

               0                  END-OF-PERIOD FLOW
          MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q

                                                                    SUM  22.15  22.15   0.00    7063.
                                                                       ( 563.)( 563.)(   0.)( 200.00)


          **********     **********     **********     **********     **********

                                 COMBINE HYDROGRAPHS

      COMBINING HYDROGRAPHS 1 & 2
                      ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                      SA-2C       2       0       0       0       0       1       0       0


          **********     **********     **********     **********     **********

                                 HYDROGRAPH ROUTING

      ROUTING FLOW THROUGH TROY RESERVOIR
                      ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                        RES       1       0       0       0       0       1       0       0
                                     ROUTING DATA
              QLOSS   CLOSS     AVG   IRES   ISAME    IOPT    IPMP            LSTR
                0.0   0.000    0.00      1       1       0       0               0

                      NSTPS   NSTOL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                          1       0       0   0.000   0.000   0.000   -472.       0

     CAPACITY=      1227.      1715.      2529.

    ELEVATION=       472.       480.       490.
```

```
       CREL    SPWID    COQW    EXPW   ELEVL    COQL   CAREA    EXPL
      472.0     17.0     3.1     1.5     0.0     0.0     0.0     0.0

                                      DAM DATA
                              TOPEL    COQD    EXPD  DAMWID
                              476.5     3.1     1.5    363.

PEAK OUTFLOW IS      3180. AT TIME  42.00 HOURS

PEAK OUTFLOW IS      1394. AT TIME  42.67 HOURS


NORMAL DEPTH CHANNEL ROUTING
----------------------------

          QN(1)    QN(2)    QN(3)    ELNVT    ELMAX    RLNTH      SEL
         0.0400   0.0300   0.0400    420.0    440.0    3000.  0.01250

          CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
              0.00  440.00   10.00  430.00  180.00  424.00  182.00  420.00  198.00  420.00
            200.00  424.00  350.00  430.00  370.00  440.00


NORMAL DEPTH CHANNEL ROUTING
----------------------------

          QN(1)    QN(2)    QN(3)    ELNVT    ELMAX    RLNTH      SEL
         0.0400   0.0300   0.0400    400.0    420.0    3000.  0.00700

          CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
              0.00  420.00   50.00  410.00  390.00  402.00  395.00  400.00  405.00  400.00
            410.00  402.00  850.00  410.00 1150.00  420.00


NORMAL DEPTH CHANNEL ROUTING
----------------------------

          QN(1)    QN(2)    QN(3)    ELNVT    ELMAX    RLNTH      SEL
         0.0400   0.0300   0.0400    390.0    410.0    1800.  0.00600

          CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
              0.00  410.00   80.00  400.00  490.00  394.00  495.00  390.00  505.00  390.00
            510.00  394.00  550.00  400.00  640.00  410.00


NORMAL DEPTH CHANNEL ROUTING
----------------------------

          QN(1)    QN(2)    QN(3)    ELNVT    ELMAX    RLNTH      SEL
         0.0400   0.0300   0.0400    288.0    310.0    2200.  0.04600

          CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
              0.00  310.00   20.00  300.00   90.00  290.00   92.00  288.00   98.00  288.00
            100.00  290.00  105.00  300.00  110.00  310.00
```

```
                                   SUB-AREA RUNOFF COMPUTATION

                  SUBAREA 3 RUNOFF COMPUTATION
                          ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE   IAUTO
                           SA-3       0       0       0      0      0       1       0       0

                                        HYDROGRAPH DATA
                  IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                      1       1    1.10    0.00   10.00    0.00   0.000       0       1       0

                                          PRECIP DATA
                      SPFE     PMS      R6     R12     R24     R48     R72     R96
                      0.00   19.50  111.00  123.00  132.00  142.00    0.00    0.00
    TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                           LOSS DATA
                 LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                     0    0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.00

                                       UNIT HYDROGRAPH DATA
                                 TP=  2.30     CP=0.66     NTA=  0

                                         RECESSION DATA
                        STRTQ=   -2.00    QRCSN=    0.00    RTIOR= 1.00

                  UNIT HYDROGRAPH 70 END-OF-PERIOD ORDINATES, LAG=   2.28 HOURS, CP= 0.65  VOL= 1.00
                 4.       15.       31.       50.       71.       93.      115.      138.      160.      178.
               192.      202.      206.      210.      207.      197.      161.      165.      153.      140.
               129.      118.      108.       99.       91.       84.       77.       70.       64.       59.
                54.       50.       46.       42.       38.       35.       32.       30.       27.       25.
                23.       21.       19.       18.       16.       15.       14.       13.       11.       11.
                10.        9.        8.        7.        7.        6.        6.        5.        5.        4.
                 4.        4.        3.        3.        3.        5.        2.        2.        2.        2.

        0                                 END-OF-PERIOD FLOW
      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q        MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                               SUM  22.15  18.49   3.66   77109.
                                                                                  ( 563.)( 470.)(  93.)( 2183.48)

            **********          **********          **********          **********          **********

                                   SUB-AREA RUNOFF COMPUTATION

                  SUBAREA 4 (BRADLEY LAKE) RUNOFF COMPUTATION
                          ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE   IAUTO
                           SA-4       0       0       0      0      0       1       0       0

                                        HYDROGRAPH DATA
                  IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                      1      -1    0.01    0.00   10.00    0.00   0.000       0       1       0

                                          PRECIP DATA
                      SPFE     PMS      R6     R12     R24     R48     R72     R96
                      0.00   19.50  111.00  123.00  132.00  142.00    0.00    0.00
    TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                           LOSS DATA
                 LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                     0    0.00    0.00    1.00    0.00    0.00    1.00    0.00    0.00    0.00    0.00

                                         RECESSION DATA
                        STRTQ=   -2.00    QRCSN=    0.00    RTIOR= 1.00
```

```
                                              END-OF-PERIOD FLOW
        0
     MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q

                                                                          SUM   22.15  22.15   0.00    1111.
                                                                              ( 563.)( 563.)(   0.)(  31.46)

          **********     **********     **********     **********     **********

                                            COMBINE HYDROGRAPHS

              COMBINING HYDROGRAPHS 2C,3&4
                            ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE  IAUTO
                            SA-4C       3       0       0      0      0       1       0      0

          **********     **********     **********     **********     **********

                                            HYDROGRAPH ROUTING

              ROUTING FLOW THROUGH BRADLEY LAKE
                            ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE  IAUTO
                              RES       1       0       0      0      0       1       0      0
                                                 ROUTING DATA
                   QLOSS    CLOSS     AVG    IRES   ISAME    IOPT   IPMP           LSTR
                     0.0    0.000    0.00       1       1       0      0              0

                            NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                                1       0       0   0.000   0.000   0.000   -268.      -1

     STAGE       288.00     289.50     290.30     291.00     292.00     293.00     293.30     294.00     295.00
                 297.00     298.00     299.00

     FLOW          0.00      45.00      86.00     181.00     356.00     591.00     675.00     729.00     768.00
                 835.00     868.00     898.00

     SURFACE AREA=      0.        0.        1.        2.        3.        4.        5.        6.        6.        7.
                        8.       16.

     CAPACITY=          0.        0.        3.       10.       22.       36.       54.       75.       99.      126.
                      163.      306.

     ELEVATION=       247.      251.      255.      259.      263.      267.      271.      275.      279.      283.
                      288.      300.

                                CREL   SPWID    COQW    EXPW   ELEVL    COOL   CAREA    EXPL
                               288.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

                                                    DAM DATA
                                         TOPEL    COQD    EXPD  DAMWID
                                         293.3     3.1     1.5    530.

     PEAK OUTFLOW IS      5379. AT TIME   42.17 HOURS

     PEAK OUTFLOW IS      2324. AT TIME   43.00 HOURS

          **********     **********     **********     **********     **********

                                          SUB-AREA RUNOFF COMPUTATION

              SUBAREA 5 RUNOFF COMPUTATION
```

```
             ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
              SA-5       0       0       0       0       0       1       0       0

                               HYDROGRAPH DATA
     IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
         1       1    0.10    0.00   10.00    0.00   0.000       0       1       0

                                  PRECIP DATA
              SPFE     PMS      R6     R12     R24     R48     R72     R96
              0.00   19.50  111.00  123.00  132.00  142.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                   LOSS DATA
   LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
       0    0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.00

                              UNIT HYDROGRAPH DATA
                         TP=  1.20     CP=0.66     NTA=   0

                                 RECESSION DATA
                STRTQ=   -2.00     QRCSN=    0.00     RTIOR= 1.00

     UNIT HYDROGRAPH 36 END-OF-PERIOD ORDINATES, LAG=   1.19 HOURS, CP= 0.66  VOL= 1.00
          2.        6.       13.       20.       26.       32.       35.       35.       32.       27.
         23.       20.       16.       14.       12.       10.        8.        7.        6.        5.
          4.        4.        3.        3.        2.        2.        2.        1.        1.        1.
          1.        1.        1.        0.        0.        0.

                              END-OF-PERIOD FLOW
   0
MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                  SUM  22.15  18.49   3.66    6906.
                                                                     ( 563.)( 470.)(  93.)( 195.56)


   **********           **********           **********           **********           **********

                               SUB-AREA RUNOFF COMPUTATION

       SUBAREA 6 (WRIGHT LAKE) RUNOFF COMPUTATION
             ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
              SA-6       0       0       0       0       0       1       0       0

                               HYDROGRAPH DATA
     IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
         1      -1    0.01    0.00   10.00    0.00   0.000       0       1       0

                                  PRECIP DATA
              SPFE     PMS      R6     R12     R24     R48     R72     R96
              0.00   19.50  111.00  123.00  132.00  142.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                   LOSS DATA
   LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
       0    0.00    0.00    1.00    0.00    0.00    1.00    0.00    0.00    0.00    0.00

                                 RECESSION DATA
                STRTQ=   -2.00     QRCSN=    0.00     RTIOR= 1.00

                              END-OF-PERIOD FLOW
   0
MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS   COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                  SUM  22.15  22.15   0.00    1002.
                                                                     ( 563.)( 563.)(   0.)(  28.37)
```

```
          **********         **********         **********         **********         **********

                                         COMBINE HYDROGRAPHS

                    COMBINING HYDROGRAPHS 4C,5&6
                              ISTAQ    ICOMP    IECON    ITAPE    JPLT    JPRT    INAME   ISTAGE   IAUTO
                              SA-6C        3        0        0       0       0        1        0       0

          **********         **********         **********         **********         **********

                                         HYDROGRAPH ROUTING

                    ROUTING FLOWS THROUGH WRIGHT LAKE
                              ISTAQ    ICOMP    IECON    ITAPE    JPLT    JPRT    INAME   ISTAGE   IAUTO
                               RES         1        0        0       2       0        1        0       0
                                               ROUTING DATA
                     QLOSS    CLOSS      AVG     IRES    ISAME    IOPT    IPMP             LSTR
                       0.0    0.000     0.00        1        1       0       0                0

                              NSTPS    NSTDL      LAG    AMSKK       X     TSK    STORA   ISPRAT
                                  1        0        0    0.000   0.000   0.000    -238.       -1

     STAGE       238.00      239.00      240.00      241.00      242.00      243.00      244.00      245.00      246.00
                 248.00      249.00      250.00

     FLOW          0.00      113.00      320.00      588.00      866.00      861.00      896.00      911.00      925.00
                 953.00      967.00      980.00

  SURFACE AREA=       0.          1.          2.          3.          4.          6.          7.          8.         12.

      CAPACITY=       0.          1.          5.         15.         29.         48.         72.        105.        222.

     ELEVATION=     209.        213.        217.        221.        225.        229.        233.        238.        250.

                              CREL     SPWID     COQW     EXPW    ELEVL     COQL    CAREA     EXPL
                             238.0       0.0      0.0      0.0      0.0      0.0      0.0      0.0

                                               DAM DATA
                                         TOPEL     COQD     EXPD   DAMWID
                                         241.0      3.1      1.5     350.

   PEAK OUTFLOW IS     5554. AT TIME  42.17 HOURS
```

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

				RATIOS APPLIED TO FLOWS	
OPERATION	STATION	AREA	PLAN	RATIO 1 1.00	RATIO 2 0.50
HYDROGRAPH AT	SA-1	1.50 (3.89)	1	3153. (89.29)(	1577. 44.65)(
HYDROGRAPH AT	SA-2	0.08 (0.21)	1	933. (26.42)(	466. 13.21)(
2 COMBINED	SA-2C	1.58 (4.10)	1	3253. (92.13)(	1627. 46.08)(
ROUTED TO	RES	1.58 (4.10)	1	3180. (90.05)(	1394. 39.48)(
ROUTED TO	30+00	1.58 (4.10)	1	3176. (89.94)(	1391. 39.40)(
ROUTED TO	60+00	1.58 (4.10)	1	3159. (89.45)(	1386. 39.27)(
ROUTED TO	78+00	1.58 (4.10)	1	3153. (89.29)(	1375. 38.94)(
ROUTED TO	100+00	1.58 (4.10)	1	3151. (89.22)(	1376. 38.96)(
HYDROGRAPH AT	SA-3	1.10 (2.86)	1	2317. (65.61)(	1159. 32.81)(
HYDROGRAPH AT	SA-4	0.01 (0.03)	1	148. (4.19)(	74. 2.10)(
3 COMBINED	SA-4C	2.70 (6.99)	1	5380. (152.34)(	2330. 65.99)(
ROUTED TO	RES	2.70 6.99)	1	5379. (152.32)(	2324. 65.82)(
HYDROGRAPH AT	SA-5	0.10 (0.25)	1	283. (8.03)(	142. 4.01)(
HYDROGRAPH AT	SA-6	0.01 (0.03)	1	136. (3.86)(	68. 1.93)(
3 COMBINED	SA-6C	2.81 (7.27)	1	5553. (157.26)(	2386. 67.57)(
ROUTED TO	RES	2.81 (7.27)	1	5554. (157.26)(	2384. 67.51)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	472.00	472.00	476.50
STORAGE	1227.	1227.	1502.
OUTFLOW	0.	0.	501.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	478.15	1.65	1662.	3180.	6.30	42.00	0.00
0.50	477.27	0.77	1549.	1394.	4.83	42.67	0.00

PLAN 1 STATION 30+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3176.	426.8	42.17
0.50	1391.	425.2	42.63

PLAN 1 STATION 60+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3159.	405.2	42.33
0.50	1360.	404.1	43.00

PLAN 1 STATION 76+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3153.	397.3	42.33
0.50	1375.	395.8	43.17

PLAN 1 STATION 100+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3151.	294.6	42.33
0.50	1376.	292.7	43.17

AD-A105 782 MALE (C T) ASSOCIATES SCHENECTADY NY F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. WRIGHT LAKE DAM (NY 00757), LO--ETC(U)
AUG 81 K J MALE DACW51-81-C-0014

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2 of 2

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	288.00	288.00	293.30
STORAGE	163.	163.	215.
OUTFLOW	0.	0.	675.

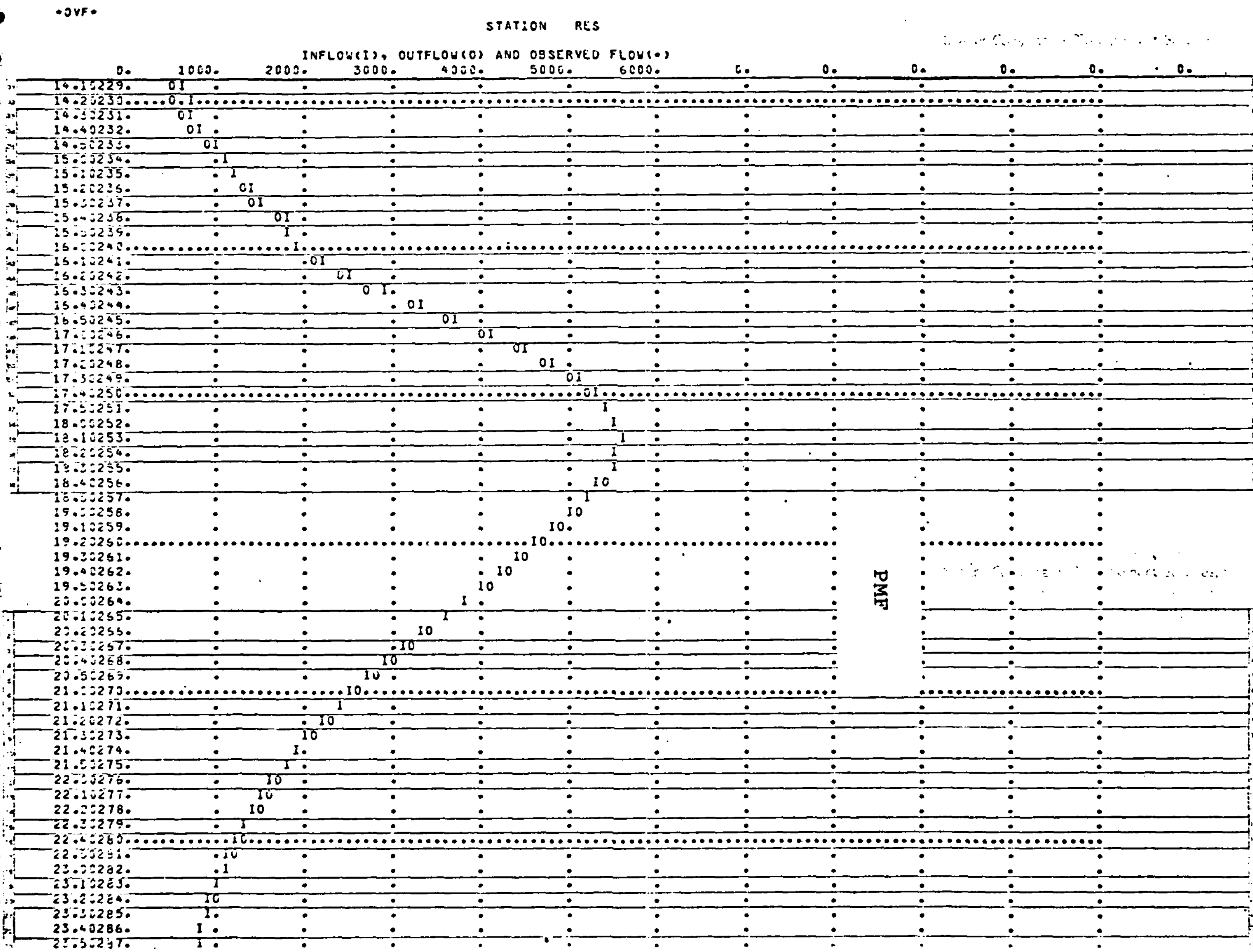
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	295.29	1.99	239.	5579.	9.50	42.17	0.00
0.50	294.28	0.98	227.	2324.	7.00	43.00	0.00

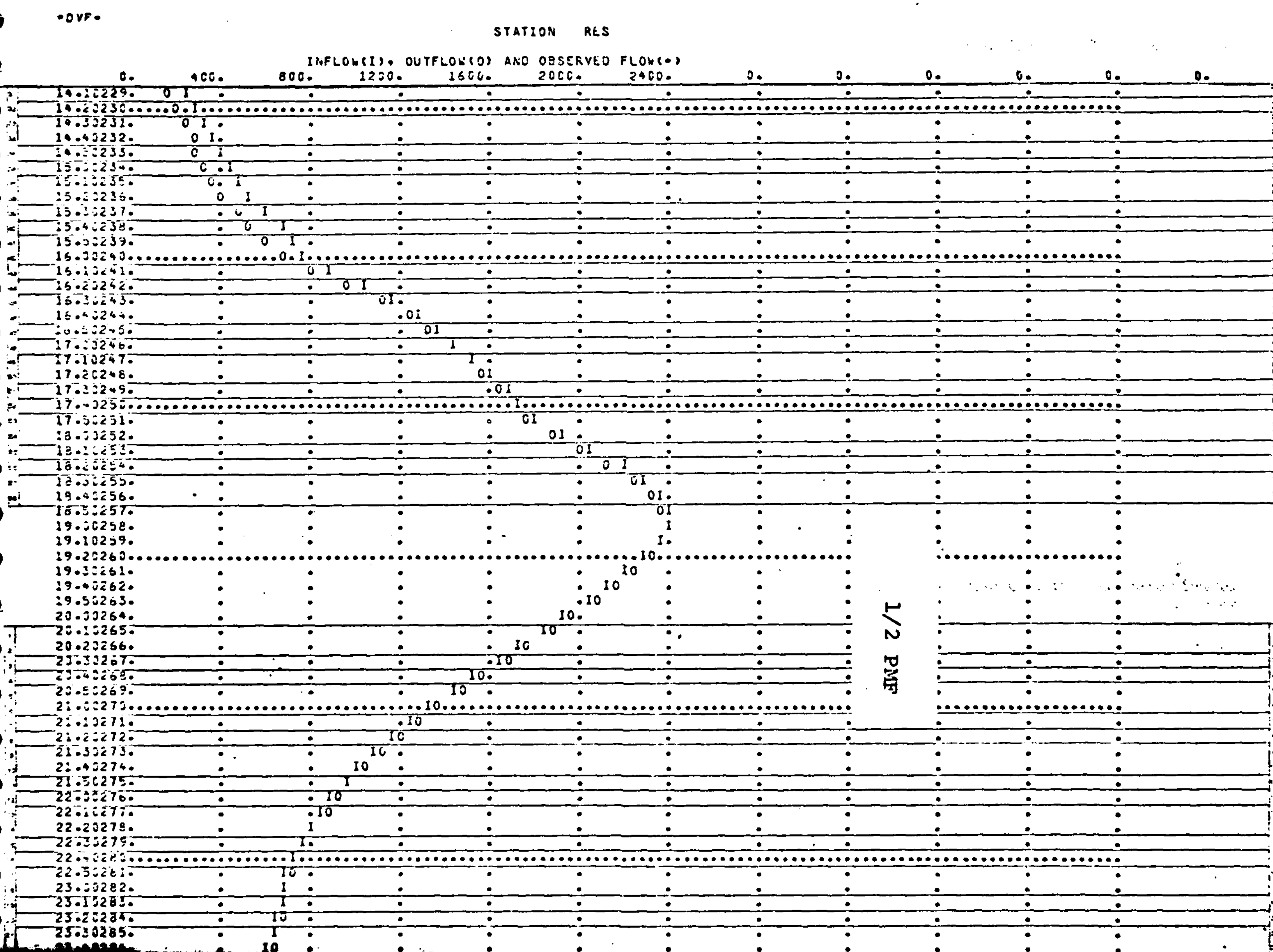
SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	238.00	236.00	241.00
STORAGE	105.	105.	129.
OUTFLOW	0.	0.	586.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	243.65	2.65	155.	5554.	9.50	42.17	0.00
0.50	242.25	-1.25	140.	2384.	8.17	43.00	0.00


OVF
STATION RES
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 1000. 2000. 3000. 4000. 5000. 6000. 0. 0. 0. 0. 0. 0.
PMF


DVF
STATION RES
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 400. 800. 1200. 1600. 2000. 2400. 0. 0. 0. 0. 0. 0.
1/2 PMF

APPENDIX D

STABILITY ANALYSIS

NO GRAVITY STRUCTURES TO ANALYZE

APPENDIX E

REFERENCES

WRIGHT LAKE DAM, NY 00757

PHASE I INSPECTION REPORT

REFERENCES

This is a general list of references pertinent to dam safety investigations. Not all references listed have necessarily been used in this specific report.

1. "Engineering and Design, National Program For Inspection of Non-Federal Dams", ER 1110-2-106, Dept. of the Army, Office of the Chief of Engineers, 26 September 1979, with Change 1 of 24 March 1980. Included as Appendix D of the ER is "Recommended Guidelines For Safety Inspection of Dams".

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3. "Flood Hydrograph Package (HEC-1), Users Manual for Dam Safety Investigations", The Hydrologic Engineering Center, U.S. Army Corps of Engineers, September 1978.

4. HMR 33, "Seasonal Variations of Probable Maximum Precipitation, East of the 105th Meridian for Areas 10 to 1000 Square Miles and Durations from 6 to 48 Hours," U.S. Dept. of Commerce, NOAA, National Weather Service, 1956.

5. HMR 51, "All-Season Probable Maximum Precipitation, U.S. East of 105th Meridian for Areas from 1000 to 20,000 Square Miles and Durations from 6 to 72 Hours", U.S. Dept. of Commerce, NOAA, National Weather Service, 1974.

6. HYDRO-35, "Five-to-60 Minute Precipitation Frequency for the Eastern and Central United States", U.S. Dept. of Commerce, NOAA, National Weather Service, June 1977.

7. "Technical Paper No. 40, Rainfall Frequency Atlas of the United States", U.S. Dept. of Commerce, Weather Bureau, 1961.

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9. King, Horace W. and Brater, Ernest F., Handbook of Hydraulics, fifth edition, McGraw-Hill Book Co., Inc., New York, N. Y., 1963.

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11. "Technical Release No. 55, Urban Hydrology for Small Watersheds", U.S. Dept. of Agriculture, Soil Conservation Service (Engineering Division), January 1975.

12. National Engineering Handbook, Section 4, Hydrology, U. S. Dept. of Agriculture, Soil Conservation Service, August 1972.

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15. "Hydrologic and Hydraulic Assessment", Appendix D of EC 1110-2-188, U.S. Army Corps of Engineers, 30 December 1977.

16. "Reviews of Spillway Adequacy, National Program of Inspection of Non-Federal Dams", ETL 1110-2-234, U.S. Army Corps of Engineers, 10 May 1978.

17. Hammer, Mark J., Water and Waste-Water Technology, John Wiley & Sons, Inc., New York, 1975.

18. "Hydraulic Charts For the Selection of Highway Culverts", Hydraulic Engineering Circular No. 5, U.S. Department of Commerce, Bureau of Public Roads, December 1965.

19. "Guide for Making a Condition Survey of Concrete in Service", American Concrete Institute (ACI) Journal, Proceedings Vol. 65, No. 11, November 1968, pages 905-918.

20. "Upper Hudson & Mohawk River Basins, Hydrologic Flood Routing Models", New York District, Corps of Engineers, October 1976.

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22. "Climatological Data, New York, September 1980", Volume 92, No. 9, National Oceanic and Atmospheric Administration, Asheville, North Carolina.

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24. "Maximum Known Stages and Discharges of New York Streams Through 1973", Bulletin 72, U.S. Geological Survey, 1976.

25. "Characteristics of New York Lakes (Gazetteer)", Bulletin 68, U.S. Geological Survey and NYS Department of Environmental Conservation, 1970.

26. "Geologic Map of New York", Hudson-Mohawk Sheet, New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., reprinted 1973.

27. "Landforms and Bedrock Geology of New York State", New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., reprinted 1973.

28. LaFleur, R. G., "Glacial Geology of the Troy New York Quadrangles", New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., 1965.

APPENDIX F

AVAILABLE ENGINEERING DATA AND RECORDS

TABLE OF CONTENTS

APPENDIX F

SECTION F1

LOCATION OF AVAILABLE ENGINEERING DATA AND RECORDS

1. Owner: City of Troy
   Department of Public Utilities
   55 Leversee Road
   Troy, NY 12182
   Attn: Richard W. Casey, Commissioner
   (518) 270-4500

   Available: Water Commissioners Reports, bathymetric map, History of Troy Water Works.

2. Designer: Believed to be the Troy Water Works Superintendent in about 1861 (deceased).

3. Construction Contractor: Believed to be City of Troy forces under charge of the Water Works Superintendent in about 1861.

4. Agency: NYS Department of Environmental Conservation
   50 Wolf Road
   Albany, NY 12233
   Attn: George Koch, P.E., Chief, Dam Safety Section
   (518) 457-5557

   Available: Inspection reports, old photo, letter.

   NYS Department of Environmental Conservation
   Division of Fish & Wildlife
   50 Wolf Road
   Albany, NY 12233
   Attn: Patrick Festa, Supervising Aquatic Biologist
   (518) 457-6937

   Available: Data on the lake.

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PHASE I INSPECTION

CHECKLIST FOR GENERAL ENGINEERING DATA
& INTERVIEW WITH DAM OWNER

Name of Dam WRIGHT LAKE DAM Fed. Id.# NY00757

Date JUNE 9, 1981 Interviewer(s) EDWIN VOPELAK JR.
JUNE 11, 1981

Dam Owner/Representative(s) Interviewed, Title & Phone#
MR. RICHARD W. CASEY, COMMISSIONER OF DEPT. OF PUBLIC UTILITIES, CITY OF TROY, (518) 270-4500
MR. NEIL BONESTEEL, DEPT. OF PUBLIC UTILITIES, CITY OF TROY, (518) 270-4510
MR. ROBERT WEAVER, COMMISSIONER OF DEPT. OF PARKS + RECREATION, CITY OF TROY, (518) 270-4550
MR. CHARLES SMITH, MAINTENANCE SUPERVISOR, DEPT. OF PARKS + RECREATION, CITY OF TROY, (518) 270-4554
MR. THOMAS MURLEY, COMMISSIONER OF PUBLIC WORKS, CITY OF TROY, (518) 270-4467

1. OWNERSHIP (name, title, address & phone #)
CITY OF TROY, CITY HALL, MONUMENT SQUARE, TROY, NY 12180
ATTN: JOHN P. BUCKLEY, CITY MANAGER (518) 270-4401
ALSO: MR. RICHARD W. CASEY, COMMISSIONER OF DEPT. OF PUBLIC UTILITIES
55 LEVERSEE ROAD, TROY, NEW YORK 12182 (518) 270-4500

2. OPERATOR (name, title, address & phone # of person responsible for day-to-day operation) DAM IS UNDER OPERATIONAL JURISDICTION OF DEPARTMENT OF PUBLIC UTILITIES, CITY OF TROY. OPERATING FACILITIES HAVE NOT BEEN USED FOR MANY YEARS.

a. Operator Full/Part time NONE

3. PURPOSE OF DAM

a. Past WATER SUPPLY FOR CITY OF TROY
(ABANDONED FOR THIS USE IN 1916)

b. Present RECREATIONAL (AESTHETIC) USES. LAKE IS NOW PART OF FREAR PARK.

4. DESIGN DATA

a. Designed When 1861

b. By (name, address, phone #, business status)
BELIEVED BY WATER WORKS SUPERINTENDANT (see Appendix F3-1)

c. Geology Reports NONE KNOWN.

d. Subsurface Investigations NONE KNOWN.

e. Design Reports/Computations (H&H, stability, seepage)
NONE KNOWN.

f. Design Drawings (plans, sections, details) NONE KNOWN.
BATHYMETRIC MAP OF RESERVOIR DATED JUNE 1894 (SEE APPENDIX G-1)

g. Design Specifications NONE KNOWN.

h. Other EXCERPTS FROM VARIOUS WATER COMMISSIONERS REPORTS (SEE APPENDICES F3-1 TO F3-5) DESCRIBING DAM DESIGN, CONSTRUCTION, MODIFICATIONS, + REPAIRS (ALL PRE-1900).

5. CONSTRUCTION HISTORY

a. Initial Construction

1) Completed When 1861 PART OF DAM + OUTLET CONDUIT FROM DROP INLET WAS PART OF ROAD EMBANKMENT PRIOR TO ITS MODIFICATION INTO A DAM. (SEE APPENDICES F3-1 + F3-2)

2) By (name, address, phone #, business status)
BUILT UNDER CHARGE OF WATER SUPERINTENDANT.

3) Borrow Sources/Material Tests NONE KNOWN.
REPORTED TO BE CLAY + SAND PUDDLE CORE + EARTH

4) Construction Reports/Photos
NONE KNOWN.

5) Diversion Scheme/Construction Sequence USED EXISTING OAKWOOD AVENUE EMBANKMENT + CULVERT + RAISED EMBANKMENT "SEVERAL FEET". ALSO REPAIRED & ADDED TO CULVERT + BUILT DROP INLET.

6) Construction Problems NO DATA

7) As-Built Drawings (plans, sections, details)
NONE KNOWN.

8) Data on Electrical & Mechanical Equipment Affecting Safe Operation of Dam NO DATA, JUST DESCRIPTION OF MECHANICAL EQUIPMENT (SEE APPENDIX F3-2) NO ELECTRICAL EQUIPMENT AT SITE.

9) Other N/A.

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b. Modifications (review design data & initial construction items as applicable & describe) FROM WATER COMMISSIONERS REPORTS

- 1880 – PAVED SOUTHEAST BANK OF RESERVOIR W/ "LARGE COBBLE STONES" AS SLOPE PROTECTION (Not Dam) Appendix F3-3
- 1884 – RAISED GRADE OF ROAD (OAKWOOD AVE.) + THEREFORE DAM HEIGHT BY AN AVG. 3'. GRADED + FILLED SOUTHERN + EASTERN SLOPES OF RESERVOIR. "1,400 yards of gravel" used in raising, see Appendix F3-5.

c. Repairs & Maintenance (review design data & initial construction items as applicable & describe)

- WATER COMMISSIONERS REPORTS (THOSE FROM PRE-1900) INDICATE THAT DAM + APPURTENANCES WERE OPERATED + MAINTAINED.
- DAM ABANDONED AS WATER SUPPLY IN 1916. (FROM HISTORY OF TROY WATER WORKS) (NOT APPENDED)
- WOODEN GATE HOUSE OVER DROP INLET + GATE CHAMBER BURNT DOWN IN MID-1960'S BY CITY.
- 1977 – TRACK RACK OF 2"x4" LUMBER + CHAINLINK FENCE PLACED OVER TOP OF DROP INLET + GATE CHAMBER.

6. OPERATION RECORD

a. Past Inspections (dates, by, authority, results)
- JUNE 20, 1921 BY NYS CONS. COMMISSION (SEE APPENDIX F3-6 FOR REPORT + PHOTO)
- AUGUST 12, 1970 by NYS-DEC (SEE APPENDICES F3-11)
- DECEMBER 8, 1970 by NYS-DEC (SEE APPENDICES F3-14)
- APRIL 28, 1978 by NYS-DEC (SEE APPENDICES F3-16 TO F3-19 FOR REPORT + LETTER)

b. Performance Observations (seepage, erosion, settlement, post-construction surveys, instrumentation & monitoring records) NONE KNOWN.

c. Post-Construction Engineering Studies/Reports

NONE KNOWN.

d. Routine Rainfall, Reservoir Levels & Discharges RAINFALL + TEMPERATURE READINGS TAKEN BY DEPT. OF PUBLIC UTILITIES AT CHLORINATION STATION FOR WATER FROM TOMHANNOCK AT MELROSE 10-15 YEARS OF RECORD @ WATER PLANT, LOCATION OF EARLIER RECORDS IS NOT KNOWN.

e. Past Floods That Threatened Safety (when, cause, discharge, max. pool elevation, any damage)

NONE KNOWN.

f. Previous Failures (when, cause, describe)

NONE KNOWN.

g. Earthquake History (seismic activity in vicinity of dam)

NONE KNOWN. THERE ARE FAULTS AT DAM SITE.

7. VALIDITY OF DESIGN, CONSTRUCTION & OPERATION RECORDS (note any apparent inconsistencies)

LIMITED DATA AVAILABLE APPEARS VALID EXCEPT: ELEVATION BASE OF BATHYMETRIC MAP (APPENDIX G-1) IS 0.6' HIGHER THAN NGVD.

8. OPERATION & MAINTENANCE PROCEDURES

a. Operation Procedures in writing? NO Obtain copy or describe. (reservoir regulation plan, normal pool elevation and status of operating facilities, who operates & means of communication to controller, mode of operating facilities, i.e., manual, automatic, remote)

- DAM FACILITIES HAVE NOT BEEN OPERATED IN MANY YEARS.
- WATER LEVEL USUALLY AT OR BELOW DROP INLET SPILLWAY CREST. DROP INLET ALWAYS OPENED W/ ALL GATES INTO GATE CHAMBER CLOSED (HAVE NOT BEEN USED IN MANY YEARS. LEAKAGE THROUGH BRICK/ CAP STONES CAUSE WATER LEVELS BELOW SPILLWAY CREST,

b. Maintenance Procedures in writing? NO Obtain copy or describe.

- CITY OF TROY DEPT. OF PARKS + RECREATION CUTS BRUSH ON U/S SIDE OF DAM + REMOVES DEBRIS FROM RESERVOIR.
- PAVED ROAD (OAKWOOD AVE.) ACROSS DAM IS MAINTAINED BY CITY OF TROY DEPT. OF PUBLIC WORKS.

c. Emergency Action Plan & Warning System in Writing? NO
Obtain copy or describe. (actions to be taken to minimize the D/S effects of an emergency)

NO EMERGENCY ACTION PLAN OR WARNING SYSTEM

9. OTHER

N/A

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APPENDIX F

SECTION F3

COPIES OF ENGINEERING DATA AND RECORDS

TABLE OF CONTENTS

The Common Council, each of the seven years, appropriated the surplus income of the Works to be expended in such improvements and constractions, as should appear to be most useful and pressing.

The entire income for these years has been disposed of thus:

For interest, salaries, labor, materials, and all ordinary expenses,	$ 81,731 44
For construction,	66,997 34
Balance in Chamberlain's office unexpended,	6,225 64
Equal to income, as above stated,	$154,954 42

The *construction* consists of:

New Reservoir of, 1859-60,	$16,571 48
Force Pump in 1859,	1,062 18
Iron Pipe and Street Mains,	35,433 15
New Reservoir of '61, partly finished,	13,930 53
	$66,997 34

The street mains laid in seven years, consists of:

766 feet 3-inch pipe.
3,790 feet 4-inch pipe.
821 feet 6-inch pipe.
5,075 feet 8-inch pipe.
4,022 feet 20-inch pipe.

14,474 feet, equal to near three miles.
23 stop-cocks, of different sizes.
18 fire plugs.

COST OF THE WATER WORKS.

The entire cost, to March, 1861, was,	$226,132 69
Add for construction this year,	15,864 65
Total cost of construction to March, 1862,	$241,997 34

OLONER

F3-1

1862 WL

WATER WORKS DEBT.

This debt, in 1855, when we took charge of the Works, was $100,000. There was paid upon it in May, 1857, $10,000; in May, 1860, $10,000, and $9,000 of the bonds, held by the Commissioners of the Sinking Fund, cancelled. The money for these payments was raised $2,500 a year in the taxes, as provided by law, for a Sinking Fund, and from the rent of the Female Seminary.

There remains due,		$71,000 00

This is payable;

May 1, 1863,	$10,000 00	
May 1, 1866,	10,000 00	
May 1, 1869,	10,000 00	
May 1, 1872,	6,000 00	
May 1, 1875,	15,000 00	
May 1, 1880,	20,000 00	$71,000 00

Interest 5 per cent., semi-annual.

A SECOND NEW RESERVOIR.

Being satisfied that the reservoir built in 1859-60 was not sufficient, in addition to the others, to furnish storage for the water of the Piscawen, we proceeded, in the spring of 1861, to treat for land east of and adjoining the Cemetery Avenue, for another reservoir. We purchased, as before stated, *seventeen acres and forty-three hundredths* of land, bounded on the west by the Avenue; and commenced work for building a dam—not by contract, but under charge of the Superintendent—Sept. 14, and continued the same until November 16. The dam is made of puddle work, consisting of clay and sand, and of earth. The back filling is the embankment of the Avenue: The puddle is 20 feet wide at the bottom, commenced several feet below the natural surface of the ground, on solid foundation, and is to be continued, gradually narrowed to 16 *feet, to the top* of the dam, 43 feet high, and extended the whole length thereof across the ravine. Instead of using iron pipes at the bottom, with stop cocks, for passing the water, as in the reservoir of 1859-60, the large culvert, under the Ave-

OWNER

F3-2

nue, is used for this purpose, and at the upper end, a well for letting the water into it. This well is 18 by 20 feet; the walls, of hard brick, are 4 feet thick at the bottom, two and a half feet at top, with strong partition wall two feet thick, to brace and support the sides and heavy stone coping on top. On this coping will be placed the gate house, resting on stone pillars a few feet above the top of the well. In the front side of the well will be the gates, four in number. The lower one, at the bottom, of heavy thick plank, and when opened to draw out all the water and the sediment, must be cut away. The other three at suitable distances apart, moveable each or all at a time, to let down water. These gates, of cast iron, are placed in heavy strong cast iron frames, and moveable on brass facings—the frames securely fastened in cut stone, embedded in the brick work. The gates are two by two and a half feet. The top of the well serves as a waste wier.

The Culvert under the Avenue, which was somewhat dilapidated, was thoroughly repaired and the Avenue raised several feet, in order to get a higher dam and a greater depth of water. The cost for these formed a considerable portion of the expense of the dam thus far.

SUPPLY OF WATER.

It will be recollected that a new Reservoir, as stated in our last annual report, on the Piscawen Creek, about eighty rods east of Cemetery Avenue, was commenced in the fall of 1859, and finished in the Spring and Summer of 1860. This reservoir was the only place of storage for water between the lakes in Brunswick and the distributing reservoir, for more than *twenty-five years*, except a small pond a few rods east of the latter, called the Fire Dam, which contained about a million of gallons, and was always kept full and in reserve, in case of need, at fires in the city. This new reservoir, estimated to contain forty to fifty millions of gallons, became filled in the fall of 1860; remained full during the winter of 1861; was full in April and May of that year, while large quantities of surplus water passed, during the Winter and Spring, to

1862WL

the Hudson—the gates to the lakes in Brunswick, in the meantime being closed, and these fountains full the 1st of May. This new reservoir continued to supply the city to the 1st of September, 1861, without opening the gates to the lakes in Brunswick, and surplus water, more or less of the time, running to the Hudson. This surplus, however, was partly from leakage in the upper lake, which, from this cause, was lowered about ten feet.

DEFICIENCY OF WATER.

From the facts given in the preceeding paragraph, we became satisfied, about the 1st of January, that, unless a "January thaw" should come to our relief, the water would fail of an adequate supply. No such relief coming, and our reservoirs nearly exhausted, we were dependent, during January, mainly upon the flow of the springs in the original upper lake, and this materially checked in its course along the line of the stream by ice and snow to the depth of three or four feet. To supply the deficiency, which we supposed would be but temporary, we at first engaged the services of

THE STEAM FIRE ENGINES.

The Arba Read was put to work Tuesday noon, January 28, at the foot of Fulton street, forcing water from the Hudson into the main pipes through the fire plug on the corner of Fulton and River streets. The next day the J. C. Osgood was placed at work at the foot of Division Street; but a location near the State Dam was more eligible than either of these, and, therefore, the steamers were transferred to that place and the water taken from the river at the State Lock, and forced into a fire plug belonging to Messrs. A. & W. Orr & Co., near their paper mill, and thence into the city mains and the distributing reservoir. This work was continued till Tuesday noon, Feb. 11, 14 days. The steamers which did the work, were the Arba Read and the Hugh Rankin, except one day by the J. C. Osgood. They worked alternately, and most of the time, night and day, and forced into the mains, each 24 hours, two hundred and fifty to three hundred thousand gallons. This quantity, with what came from the Piscawen

OLVER

for sale as the case might be, a new lease and agreement for one year from the first of January last was entered into to provide for the necessary privileges at the expense of $600 and a *per diem* allowance of $16 for every day the pump shall be run. The pump will thus be in readiness should any possible emergency arise to require its use; and ample time will also be afforded to find a market for the property at reasonable figures.

The southeast bank of lower Oakwood reservoir has, during the past summer, been substantially paved with large cobble stones in order to prevent the roiling of the water by the wash of clay and earth from the bank during the prevalence of strong westerly winds. This was a much needed improvement. It will give the reservoir a more neat and cleanly appearance—afford a very necessary protection to its banks, and prevent any deterioration of the water from lateral washing. The expense of this improvement has been $2,104.50.

It is proper to state in this connection that the duty of regulating the flow of the water, the charge of all the ponds and reservoirs and, indeed, of all the city property connected with our system of gravity supply, has been placed in the hands of Mr. John Hare, a well-known resident of Brunswick, and a man of whose integrity, responsibility and perfect reliability, we are well assured, both from his general reputation and from many years of personal and familiar acquaintance with him. It should also be mentioned that in connection with these grave and responsible duties, Mr. Hare has been appointed special policeman, without pay from the police board, for the due protection of the interests under his charge.

The small building at upper Oakwood reservoir, for many years used as a dwelling house for the keeper of the reservoirs, having become dilapidated and unsuitable for further occupation, and its situation being also extremely undesirable, it has been decided to construct a

1880-81 WL

new and more suitable building on an eminence adjacent to the reservoirs and commanding a view of all their approaches and also of Oakwood avenue. Contracts for the whole work have, accordingly, been entered into with responsible parties, in the sum of $3,028.66, the work to be completed on or before the fifteenth day of June next.

During the past season, 6-inch mains have been laid in Lansing avenue, Walker avenue, and a portion of Linden avenue, in the fifth ward. The low service distribution has been improved and extended by laying a 6-inch main in Vail avenue from Turner's lane to the northern limits of the city, a 6-inch main in Madison street from Fourth street to Fifth street, and also in Fifth street from Madison street to Canal avenue. In Monroe street the 8-inch main has been extended westward from First street to a point about 150 feet west of River street. In Mill street in the sixth ward an 8-inch main has been laid from Fourth street eastwardly about 435 feet. In Tyler street a 6-inch main has been laid from Fourth street to Hudson street. In Hutton street a 6-inch main has been laid from River street to North First street. A much needed improvement was also made in Broadway by taking out five hundred feet of old 3-inch pipe between River and Third streets and replacing it with 8-inch pipe. Similar improvements in Ferry, Second and Division streets and elsewhere are under contemplation. These mains and perhaps others will probably be taken up and relaid as soon as more pressing matters can be disposed of. The extreme and unusual cold of the past winter has caused great and very general inconvenience by the freezing of laterals. The temperature of the water in the mains was unusually low. It was found, by actual observation, to be 34 degrees during the month of February.

The total length of mains laid last year is 5,903 feet, of which 500 feet was 8-inch pipe laid in *Broadway* to re-

Last year, in addition to these ordinary expenses, and especially in meeting the requirements of the civil authorities of the city in relation to the condition of the streets and sewers, this Department has been forced into expenditures quite considerable in amount and entirely exceptional in character—notably in Second street, which, after laying the new 12-inch main, was, at the request of the Contracting Board, repaved by contract, and the work accepted by the city engineer. The paving proved subsequently to be defective, and as a result this Board was called on for constant repairs over this entire line of pipe from River to Adams street In State street, and Congress street, where sewers had, in former years, been constructed without any reference to mains and laterals already existing there, further than to build *in and enclose them in* the body of the sewer, this Department was called on to take out these mains and laterals, so that no obstruction whatever should be offered to the free passage of the sewage. The entire connection of the Fifth street and Congress street mains was accordingly lowered to pass under the sewer, at an expense of $434.02. At State street it was passed over the sewer, and all the house laterals taken out of it, at an expense of $140.62. Much expense was also entailed upon the Department in protecting the mains and restoring or repairing broken connections in localities where the streets had been opened for the construction of sewers. In the case especially of the large sewer in the northern part of the city, the expenditures resulting directly or indirectly from this cause were continuous and quite extensive. The 20-inch main in Burdett avenue was also lowered to meet the new grade of Hoosic street, as was the 6-inch main in Eleventh street between Eagle and Jacob for a similar purpose. More gravel has been placed on the streets throughout the city, and more repairing done than in any previous year in the history of the Department, a natural result, probably, of the large number of house laterals put in during the last two years, and of the repairs incident to the failure of old mains and laterals.

QUNER

F3-4

1884 WL BL
(1885)

It will appear also by reference to the construction account on another page, that a very considerable amount of new or construction work has been accomplished during the past season. Under the pressure of urgent necessities and of numerous petitions from our citizens and also of suggestions and requests from your honorable body, the Department has expended in construction the past year, the sum of $24,219.78, aside from the laying of the 24-inch main which was $15,192.08, making a total expenditure for construction of $39,411.86 as against $23,712.11 the last year, an excess of $15,699.75, to which should be added $6,000 for iron pipe purchased and paid for on account of the South Troy extension to be continued the coming summer and which will only appear in the construction account of the coming year; thus making in all an excess of $21,699.75 over the expenditures of last year for the same purpose.

At the pumping station the results obtained to date have more than met the expectations of the Department in adopting the Jarvis setting for the boilers. They fully justify the belief that the working expenses of the station for the current year will be largely reduced. The re-setting of the south battery of boilers, was completed in November last, at a cost of $5,743.97. In September last, the left front steam cylinder of engine No. 1, which had been cracked in the flange of the lower head, was condemned as unsafe, and a new cylinder ordered to be made. For full details of these and all other matters relating to this branch of the service, and also to the question of waste, we respectfully refer your honorable body to the annexed report of the Chief Engineer.

At Oakwood reservoir and vicinity, a small force of men has been kept at work during the greater portion of the past season. The work accomplished has added greatly to the beauty and general appearance of the city property at that point, while at the same time it has resulted in practical benefits that more than compensate for the expenditure.

The work done includes some filling and grading at the east end of Eddy's Lane, and the construction at that point of a basket gutter along the roadway on the north side of the new distributing reservoir, the grading and filling in of Oakwood avenue, from Eddy's Lane across the dam to Summit avenue, the widening, grading and fencing of the roadway running east from Oakwood avenue along the southerly side of the reservoir, and the grading and filling in of the depression on the east side of the reservoir and over the line of the brick culvert constructed in 1884.

Of these improvements the most important, as it was the most expensive, was the raising of the grade of Oakwood avenue an average of three feet from Summit avenue northward and across the dam. The effect of the new grade is to improve the roadway and its surroundings, and also to so change the water-shed as to carry the surface drainage of that locality from Summit avenue northwardly and across the dam to the entrance of Glen avenue, or Eddy's Lane, where it finds an outlet in a ditch and carefully constructed basket gutter, which takes the water down the lane and discharges it into the bed of the creek below the dam of the new distributing reservoir. The improvement was suggested by the fact that under the old grade all the surface drainage of the entire space above described, discharged directly into the southeast corner of the distributing reservoir, forming always a bad and troublesome place in the roadway, and also a very objectionable feature in the water supply.

The roadway leading from Oakwood avenue along the southerly bank of the reservoir, which as first constructed was too narrow for the passing of teams, and was otherwise unsafe, has been graded and enlarged to a uniform width of fourteen feet, and for protection against accident a strong 2 x 4 guard-rail, on four foot posts with six foot spaces, has been run on the outer edge of the roadway from the gateway at Oakwood to the gateway at the southeast

OWNER

F3-5

1884 WL
BL
(1835)

corner of the reservoir, a distance of about 650 feet. On this roadway some more filling and grading yet remains to be done, and also some further sloping and turfing of the rising ground on the south border of the road, in order to make it secure from shoving or falling on the track. A mere glance at the situation will show that the necessity, convenience and utility of this improvement when entirely completed, forming as it does a useful protection to the south bank of the reservoir, is beyond question; nor does it detract from the value of these considerations that as a further result of this improvement, the beauty and attractive appearance of this portion of the city property will be very considerably enhanced.

On the eastern side of this reservoir the depression or ravine through which the new culvert was conducted has been partially filled up. When the grading and filling here is completed, it will afford entire protection to the culvert by its ample earth covering, and will also result in redeeming not less than one acre of land formerly useless for any purpose. The general appearance of this bank of the reservoir, as seen from the avenue, will also be greatly improved.

The entire expense of these four improvements, as far as now completed, has included 600 days' labor ($900), 203 days' teaming ($812), posts, rails and nails ($21); total, $1,733, a comparatively small sum compared with the amount of work accomplished and the results attained, especially when it is considered that on Oakwood avenue and dam alone, in order to raise the grade as stated, there were put over 1,400 yards of gravel.

The work of new fencing the water works lands, begun in 1882, and resumed in 1884, was taken up again the past year and nearly completed. The fence now encloses the plot of land recently acquired by the Department, at the corner of Oakwood and Summit avenue, and also the new distributing reservoir west of Oakwood dam. That portion

Form W51. 5-12-16-2000 (16-16755) Acc. 382

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK
CONSERVATION COMMISSION
ALBANY

DAM REPORT

June 20, 1921
(Date)

CONSERVATION COMMISSION,

S-226-14B. U Hudson

DIVISION OF WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Old Reservoir no. 2 ~~Dam.~~

This dam is situated upon the .... (Give name of stream)
in the City ~~Town~~ of Troy, Rensselaer County,
about .... (State distance) from the Village or City of ....

The distance down (Up or down) stream from the dam, to ~~the~~ Oakwood ave (Give name of nearest important stream or of a bridge), is about 20 ft (State distance)

The dam is now owned by City of Troy (Give name and address in full)
and was built in or about the year ...., and was extensively repaired or reconstructed during the year ....

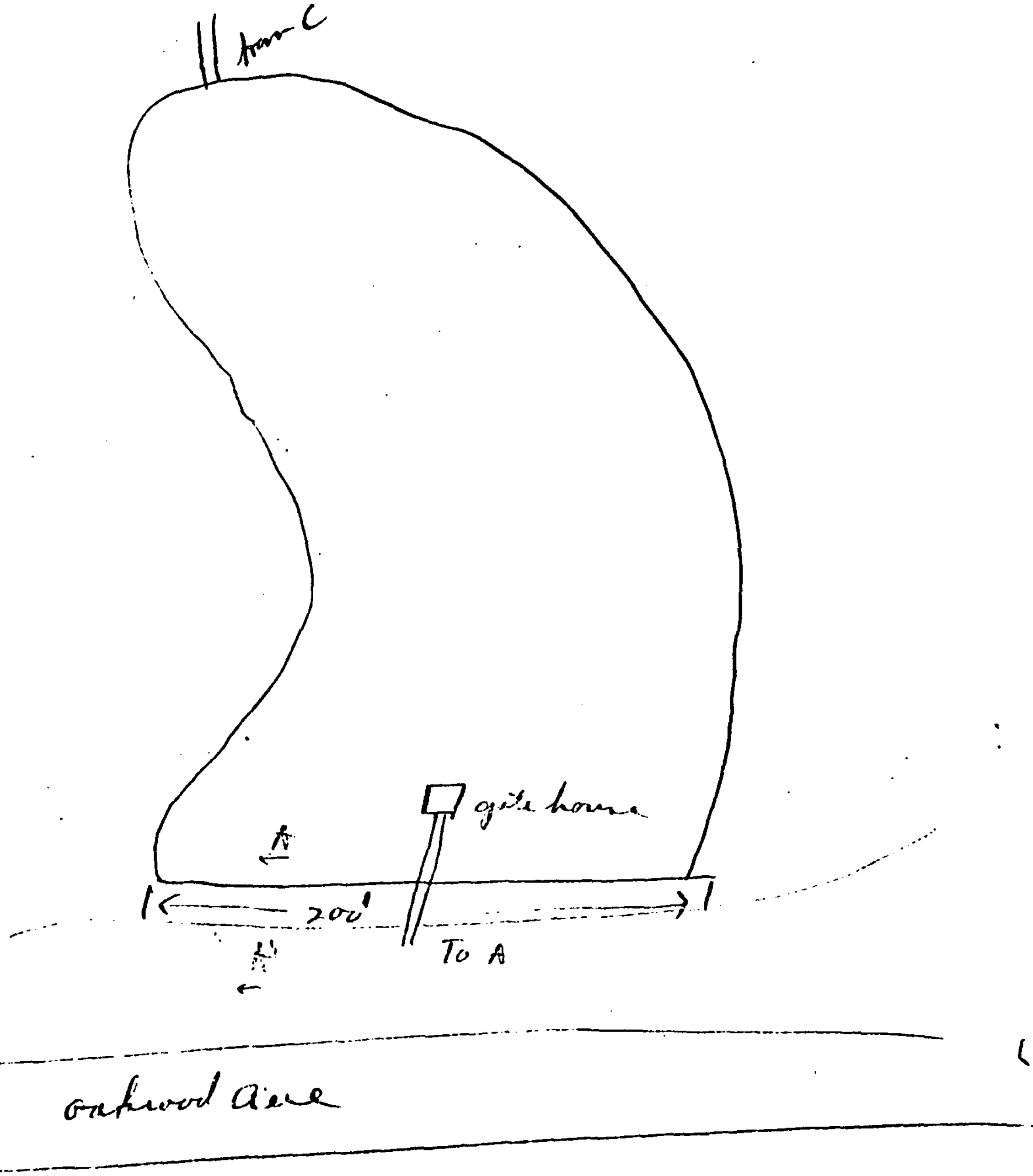
As it now stands, the spillway portion of this dam is built of earth (State whether of masonry, concrete or timber)
and the other portions are built of masonry (State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is gravel and shale and under the remaining portions such foundation bed is " " "

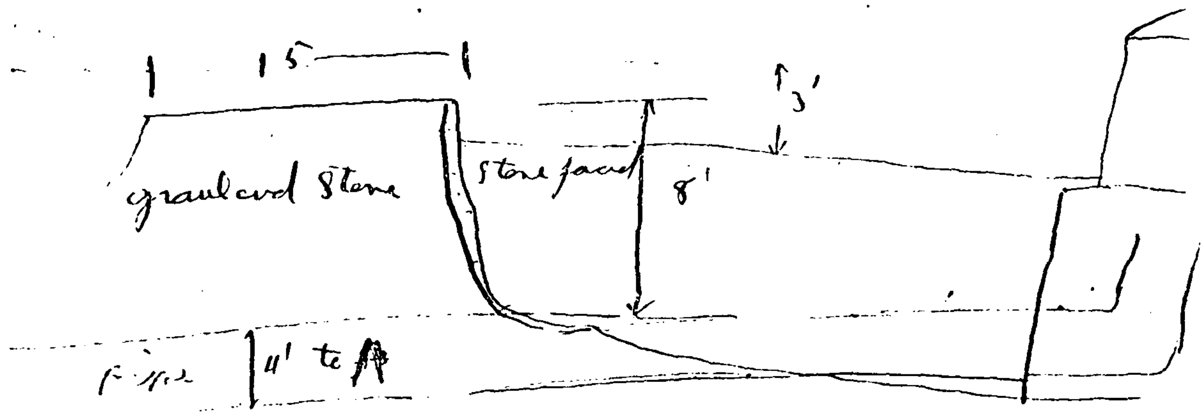
PEC

F3-6

(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)



(In the space below, make one sketch showing the *form* and *dimensions* of a cross section through the spillway or waste-weir of this dam and outline the abutment, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)



The total length of this dam is 200 feet. The spillway or waste-weir portion, is about .... feet long, and the crest of the spillway is about 3 feet below the abutment.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: One 4' pipe

At the time of this inspection the water level above the dam was .... ft. 15 in. below ~~above~~ the crest of the spillway.

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks or erosions which you may have observed.)

Dam is in good condition,

Reported by Donald Baxter
(Signature)

137 Furman St.
(Address—Street and number, P. O. Box or R. F. D. route)

Syracuse N.Y.
(Name of place)

F3-9

Wright Lake Dam and gate house from upstream - 6/20/21

DEC DAM INSPECTION REPORT

RB	CTY	YR. AP.	DAM NO.	INS. DATE	USE	TYPE
02	42	01	14B	120870	002	2

AS BUILT INSPECTION

1	Location of Spillway and outlet	1	Elevations
1	Size of Spillway and outlet	1	Geometry of Non-overflow section

1 **GENERAL CONDITION OF NON-OVERFLOW SECTION**

1	Settlement	1	Cracks	1	Deflections
1	Joints	1	Surface of Concrete	1	Leakage
1	Undermining	1	Settlement of Embankment	1	Crest of Dam
1	Downstream Slope	1	Upstream Slope	1	Toe of Slope

1 **GENERAL CONDITION OF SPILLWAY AND OUTLET WORKS**

4	Auxiliary Spillway	1	Service or Concrete Spillway	4	Stilling Basin
2	Joints	2	Surface of Concrete	2	Spillway Toe
4	Mechanical Equipment	4	Plunge Pool	4	Drain

2	Maintenance	B	Hazard Class
3	Evaluation	34	Inspector

COMMENTS:

Gate house is gone from drop inlet structure

City street searves as embankment

DEC

DEC DAM INSPECTION REPORT CODING

1. River Basin - Nos. 1-23 on Compilation Sheets
2. County - Nos. 1-62 Alphabetically
3. Year Approved -
4. Inspection Date - Month, Day, Year
5. Apparent use -
   1. Fish & Wildlife Management
   2. Recreation
   3. Water Supply
   4. Power
   5. Farm
   6. No Apparent Use
6. Type -
   1. Earth with Aux. Service Spillway
   2. Earth with Single Conc. Spillway
   3. Earth with Single non-conc. Spillway
   4. Concrete
   5. Other
7. As-Built Inspection - Built substantially according to approved plans and specifications

Location of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications.
2. Not built according to plans and specifications and location appears to be detrimental to structure.
3. Not built according to plans and specifications but location does not appear to be detrimental to structure.

Elevations

1. Generally in accordance to approved plans and specifications as determined from visual inspection and use of hand level.
2. Not built according to plans and specifications and elevation changes appear to be detrimental to structure.
3. Not built according to plans and specifications but elevation changes do not appear to be detrimental to structure.

Size of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications as determined by field measurements using tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

Geometry of Non-overflow Structures

1. Generally in accordance to originally approved plans and specifications as determined from visual inspection and use of hand level and tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

General Conditions of Non-Overflow Section

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(items) For boxes listed on condition under non-overflow section.

1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.

DEC

DEC DAM INSPECTION REPORT CODING (cont.)

General Condition of Spillway and Outlet Works

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(Items) For boxes listed conditions listed under spillway and outlet works.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.
4. Dam does not contain this feature.

Maintenance

1. Evidence of periodic maintenance being performed.
2. No evidence of periodic maintenance.
3. No longer a dam or dam no longer in use.

.S.)

Hazard Classification Downstream

1. (A) Damage to agriculture and county roads.
2. (B) Damage to private and/or public property.
3. (C) Loss of life and/or property.

Evaluation - Based on Judgment and Classification in Box Nos.

Evaluation for Unsafe Dam

1. Unsafe - Repairable.
2. Unsafe - Not Repairable.
3. Insufficient evidence to declare unsafe.

River Basins	Counties	
(1) LOWER HUDSON	1 Albany	36 Orange
(2) UPPER HUDSON	2 Allegany	37 Orleans
(3) MOHAWK	3 Bronx	38 Oswego
(4). LAKE CHAMPLAIN	4 Broome	39 Otsego
(5) DELAWARE	5 Cattaraugus	40 Putnam
(6) SUSQUEHANNA	6 Cayuga	41 Queens
(7) CHEMUNG	7 Chautauqua	42 Rensselaer
(8) OSWEGO	8 Chemung	43 Richmond
(9) GENESEE	9 Chenango	44 Rockland
(10) ALLEGHENY	10 Clinton	45 St. Lawrence
(11) LAKE ERIE	11 Columbia	46 Saratoga
(12) WESTERN LAKE ONTARIO	12 Cortland	47 Schenectady
(13) CENTRAL LAKE ONTARIO	13 Delaware	48 Schoharie
(14) EASTERN LAKE ONTARIO	14 Dutchess	49 Schuyler
(15) SALMON RIVER	15 Erie	50 Seneca
(16) BLACK RIVER	16 Essex	51 Steuben
(17) WEST ST. LAWRENCE	17 Franklin	52 Suffolk
(18) EAST ST. LAWRENCE	18 Fulton	53 Sullivan
(19) RACQUETTE RIVER	19 Genesee	54 Tioga
(20) ST. REGIS RIVER	20 Greene	55 Tompkins
(21) HOUSATONIC	21 Hamilton	56 Ulster
(22) LONG ISLAND	22 Herkimer	57 Warren
(23) OSWEGATCHIE	23 Jefferson	58 Washington
(24) GRASSE	24 Kings	59 Wayne
	25 Lewis	60 Westchester
	26 Livingston	61 Wyoming
	27 Madison	62 Yates
	28 Monroe	
	29 Montgomery	
	30 Nassau	
	31 New York	
	32 Niagara	
	33 Oneida	
	34 Onondaga	
	35 Ontario	

DEC

[illegible]

DER DAM INSPECTION REPORT

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
02	42	01	00014B	081270	002	2

AS BUILT INSPECTION

1	Location of Sp'way and outlet	1	Elevations
1	Size of Sp'way and Outlet	1	Geometry of Non-overflow section

1	GENERAL CONDITION OF NON-OVERFLOW SECTION				
1	Settlement	1	Cracks	1	Deflections
1	Joints	1	Surface of Concrete	1	Leakage
1	Undermining	1	Settlement of Embankment	1	Crest of Dam
1	Downstream Slope	1	Upstream Slope	1	Toe of Slope

1	GENERAL COND. OF SP'WAY AND OUTLET WORKS				
4	Auxiliary Spillway	1	Service or Concrete Sp'way	1	Stilling Basin
1	Joints	1	Surface of Concrete	1	Spillway Toe
4	Mechanical Equipment	4	Plunge Pool	4	Drain

2	Maintenance	B	Hazard Class
3	Evaluation	34	Inspector

COMMENTS:

1. PROTECTIVE COVER NEEDED OVER DROP INLET TO REPLACE NON-EXISTANT GATE HOUSE.

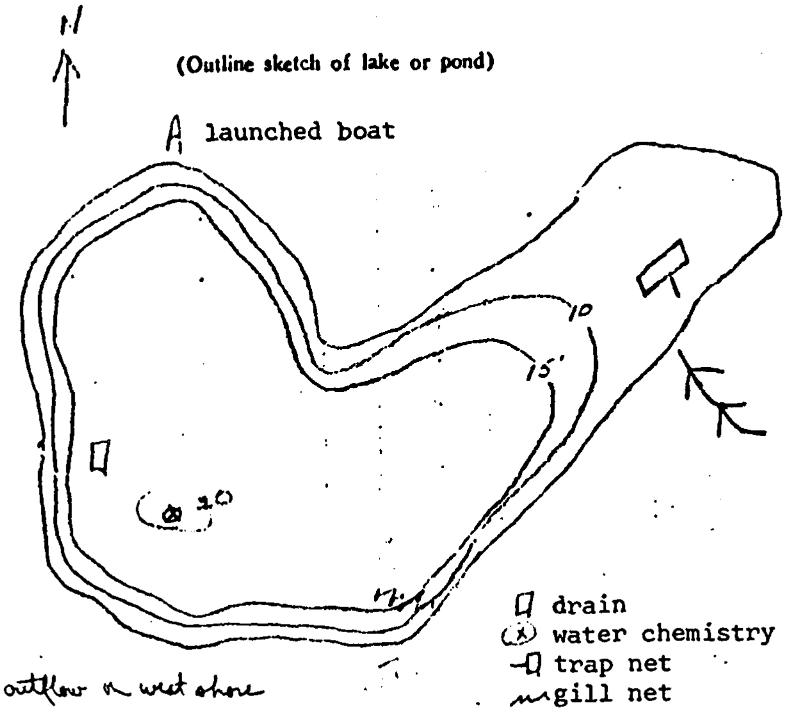
DEC

WRIGHT LAKE (LOWER LAKE)

1976

(Outline sketch of lake or pond)

N
S



drain pipe outflow on west shore

(Indicate principal weed beds, type of bottom and points where soundings were taken on sketch; also indicate, by numbers, points where collections were taken)

Area 6 Elevation 250 ft.

If posted: Owner's name and address..........

90% 10%

Bottom: clay, gravel, marl, muck, rock, ~~sand~~ (underline; give % of each type) 100%

10%

Vegetation: scant, fair, abundant, floating, submerged (underline; give % of each type)

Source: springs in bottom, spring streams, surface water (underline)

Shore line: wooded, swampy, cultivated shrubbery

Color of water: white, light brown, brown green

Height of dam if present none

Accessibility: road, trail, portage..........

NYSDEC BUREAU OF FISH & WILDLIFE

Game fish : non-game fish ratio ...... Nor

Trout spawning success...... Nor

Fertility: ...(3)...... Producti

Soil type ...(3).......

Invertebrate food 2

Accessible forage a: ...... or

Management: Trou 2

bait, spearing (ch 2

Salvage netting..........

Other management..........

Stocking LmB; CnS; 3gS;

F3-15

Rev. 3/77)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Federal

Dam Number	River Basin	Town	County	Hazard Class	Date & Inspector
1413	Upper Hudson	City of Troy	Renss.	* C	4/25/78 BC

Stream = WRIGHT Lake   Owner = City of Troy

Type of Construction

- ☐ Earth w/Concrete Spillway
- ☒ Earth w/Drop Inlet Pipe
- ☐ Earth w/Stone or Riprap Spillway
- ☐ Concrete
- ☐ Stone
- ☐ Timber
- ☐ Other ______

Use

- ☐ Water Supply
- ☐ Power
- ☒ Recreation - ☐ High Density
- ☐ Fish and Wildlife
- ☐ Farm Pond
- ☐ No Apparent Use-Abandoned
- ☐ Flood Control
- ☐ Other ______

Estimated Impoundment Size 6-7 Acres### Estimated Height of Dam above Streambed 30 Ft.

Condition of Spillway

- ☒ Service satisfactory
- ☐ In need of repair or maintenance
- ☐ Auxiliary satisfactory
- ☐ In need of repair or maintenance

Explain: No Emergency Spillway.

Condition of Non-Overflow Section

- ☐ Satisfactory
- ☒ In need of repair or maintenance

Explain: Trees growing on slope. letter sent

Condition of Mechanical Equipment

- ☐ Satisfactory
- ☐ In need of repair or maintenance

Explain: None

Siltation ☐ High ☐ Low

Explain:

Remarks: *C- (HAZARD) 1/4 mi downstream stream goes into a storm sewer and underneath the city. Difference in Elevation of Lake and downstream hazard is about 200'. If structure should go out there is a potential for severe damages.

Evaluation (From Visual Inspection)

☒ Repairs req'd. beyond normal maint. ☐ No defects observed beyond normal maint.

PEC

F3-16

May 2, 1978

Mr. Thomas Murley, City Engineer
City Hall
Troy, New York

Re: Dam #14B and 14C
Upper Hudson Watershed

Dear Mr. Murley:

Recently we inspected two dams owned by the City of Troy in Frear Park known as Wright Lake (14B) and Bradley Lake (14C). We have noted several deficiencies in these structures. Following is a listing of problem areas in each structure:

Wright Lake Structure 14B - Bordering Oakwood Ave.

1. Trees and brush are growing on the downstream slope of the embankment. This is an unacceptable practice since the extensive root system of trees can start possible leaks.

2. There isn't any emergency spillway on this structure other than a small culvert.

Bradley Lake Structure 14C - Bordering the Playground in Frear Park

1. Trees and brush are growing on the downstream slope of the embankment.

2. Logs and debris are clogging the emergency spillway.

3. The culvert through the embankment is made of red bricks. Some of these are missing and the entire culvert appears to be deteriorating. The outlet of this culvert flows down the side of the embankment which is eroding.

DEC

Some type of engineering study should be made of these structures. Recommendations for maintenance and repair of these structures should be forwarded to this office. We might point out that in case of failure of one or both of these structures, the City of Troy could be liable for downstream damages occurring to downstream residents or property.

Sincerely,

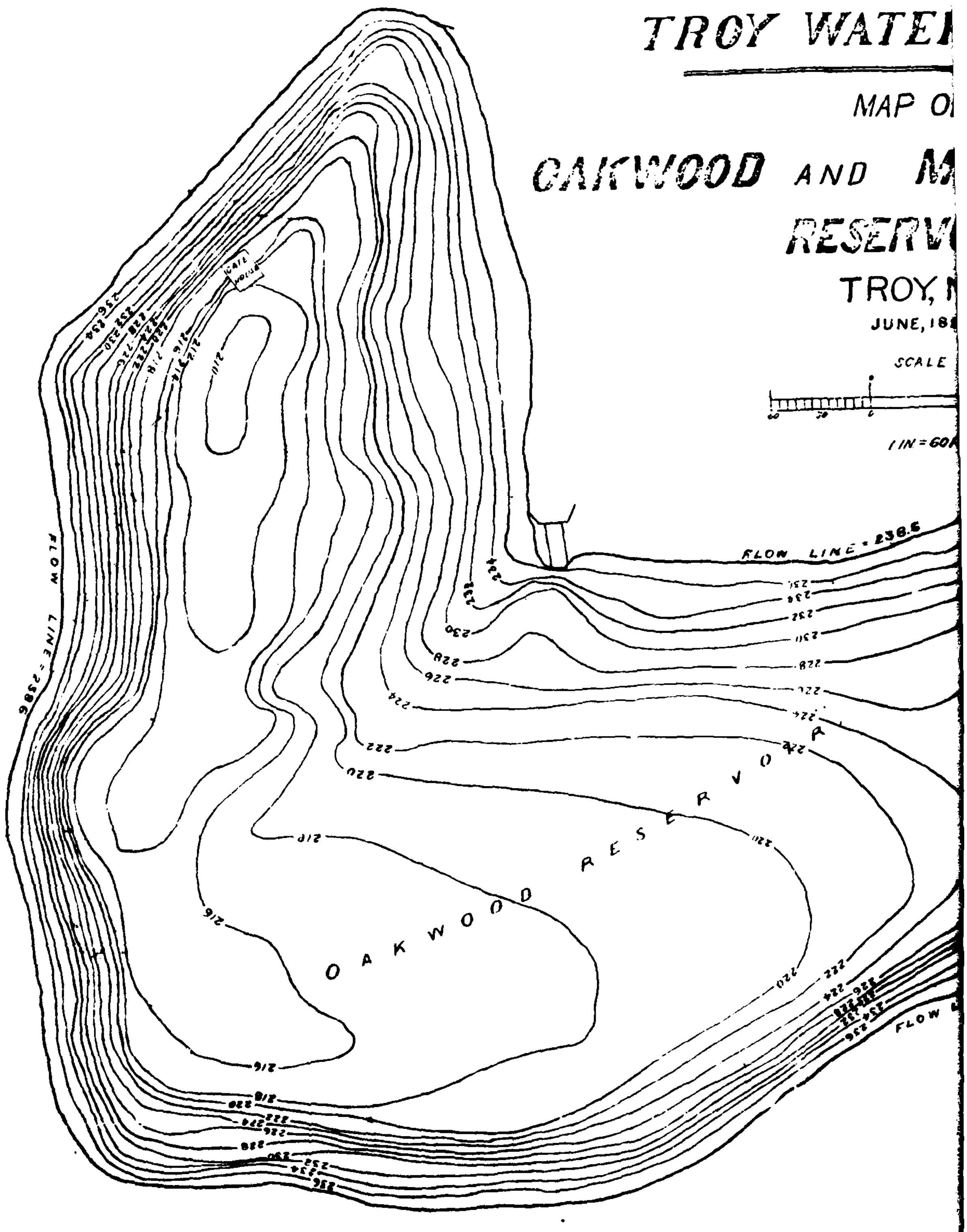
William Coleman
Dam Safety Section

DEC

APPENDIX G

DRAWINGS

TABLE OF CONTENTS



FROM OWNER
REDUCED TO 72 % OF ORIGINAL

ROY WATER WORKS.

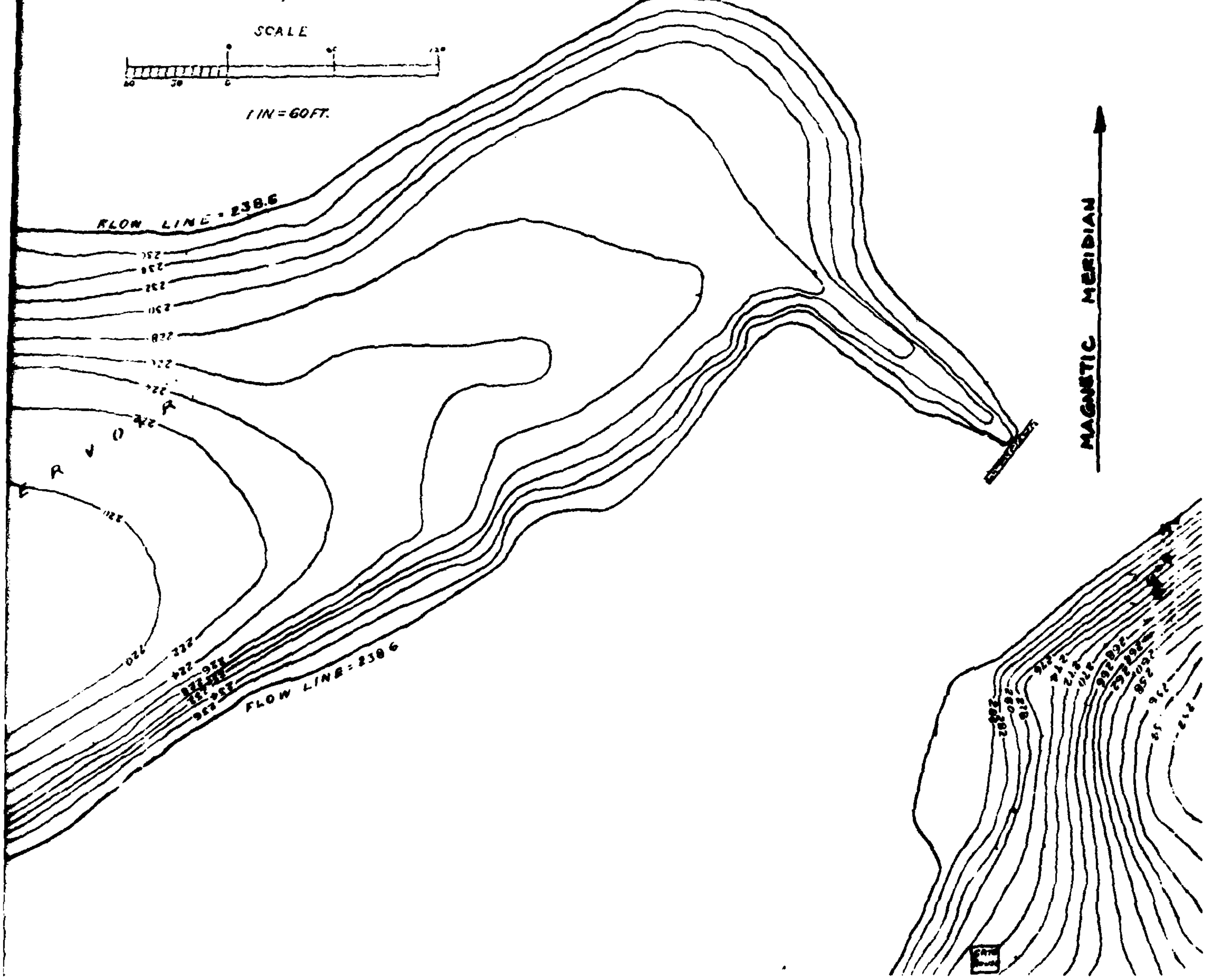
MAP OF

OOD AND MIDDLE SERVICE

RESERVOIRS.

TROY, N.Y

JUNE, 1894.



G-1 CTM DWG NO. 81-5